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PERIOPERATIVE CARE IN THE ELDERLY UROLOGIC PATIENT

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Urologists can expect to see an increasing number of older patients who are candidates for invasive procedures and surgeries. This also applies to the oldest-old (greater than 85 years) who previously may have been excluded from consideration. It currently is projected that a person who is 90 years old will live at least 4 more years, and that someone who is 100 years old can expect to live to 103. As the population ages, chronic disease becomes a major health factor. The most prevalent chronic conditions in the elderly include arthritis, sensory impairment, hypertension, cardiac conditions, and cognitive impairment; however, the presence of chronic conditions per se has little effect on operative mortality. Rather, there are patient-specific factors, procedure-specific factors, and provider-specific factors that are important to patient outcome. This article examines this issue with respect to the elderly urologic patient and addresses practical aspects for preoperative evaluation and postoperative care.

SURGICAL RISK

Surgical mortality has been classified based on when it occurs. Perioperative mortality is defined as death occurring during the operation or within 48 hours of surgery. Postoperative death is defined as death occurring within 6 weeks of surgery. The intraoperative period probably is the safest time for the patient—death during anesthesia is very rare.[25] The most dangerous time for the patient is the perioperative period following surgery, which is associated with major metabolic, hemodynamic, hemostatic, and neurohumoral stressors. Causes of perioperative death include inadequate ventilation, aspiration, arrhythmias, drug-related myocardial depression, myocardial infarction (MI), and refractory hypotension. Most MIs related to surgery occur in the perioperative period. Increased sympathetic nervous system activity related to inadequate pain control and other stressors may underlie some of these factors.[17] Common causes of postoperative mortality include pneumonia, peritonitis or gram-negative sepsis, cardiac arrest, pulmonary embolism, renal failure or hypovolemic shock, inoperable cancer or stroke, and surgical risk.

The overall degree of risk of surgery plus anesthesia conventionally is classified as shown in Table 1. High-risk procedures are those that are associated with unstable medical conditions, long operative times, large intra- and extravascular fluid shifts, or high-risk anatomic locations. The highest risk procedure is emergency surgery, which may increase risk from 1% to as high as 45%. Other high-risk procedures include aortic and peripheral vascular surgery, primarily because

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Table 1. RISK OF SURGERY AND ANESTHESIA

Risk Category	Mortality (%)
Usual risk	0–0.01
Low risk	0.01–0.9
Significant risk	1–5
Moderate risk	5–10
High risk	10–20
Very high risk	>20

of the high incidence of associated coronary artery disease among patients undergoing these procedures. Intrathoracic and intraperitoneal surgeries generally are classified as being of intermediate risk. Low-risk procedures include cystoscopy, dilation and curettage, eye surgery, hysterectomy, herniorrhaphy, and plastic surgery. Thus, most procedures performed by the urologist are classified as being of low to intermediate risk, unless performed on an emergency basis.

Although local or regional anesthesia often are used in the elderly, the choice between general and spinal or epidural anesthesia does not seem to affect outcome among patients with coronary artery disease.[27] It also does not seem to affect postoperative cognitive function.[45] If severe left ventricular dysfunction is present, however, spinal or epidural anesthesia is preferred because of the negative inotropic effects of general anesthetics. General anesthesia may be preferred in the anxious patient for whom being awake during surgery may invoke increased stress and subsequent adverse results.

Minor surgical procedures often can be done using local or regional anesthesia combined with sedative and analgesic medications, usually administered by an anesthesiologist under monitored conditions (monitored anesthesia care).[47] Because of the importance of postoperative pain control, patient-controlled sedation using epidurally administered agents is an attractive option.[32] Minor urologic procedures that can be done using local or regional anesthesia include cystoscopy, transurethral resection (or incision or laser ablation) of the prostate, transurethral resection of noninvasive bladder tumors, ureteroscopy, stent placement, and extracorporal shock wave lithotripsy. Benzodiazepines are used for their anxiolytic, sedative, and amnestic properties. Midazolam is used most commonly; diazepam should be avoided in the elderly because of its prolonged half-life, active metabolites, and enterohepatic recirculation. A specific benzodiazepine antagonist, flumazenil, is available but, if used, the patient must be monitored closely for resedation because of its short half-life. Propofol commonly is used because of rapid recovery, lack of postoperative nausea and vomiting, minimal cardiorespiratory depression, and excellent sedation. It causes less amnesia for intraoperative events than midazolam. Opiods, such as fentanyl, sufentanil, and alfentanil, often are used in combination with sedatives to augment the analgesia of local anesthetics. Such combinations are quite effective but excessive respiratory depression must be avoided. Very promising are cosedation techniques using combinations, such as midazolam, propofol, and fentanyl (or a derivative).[29] Another potential problem to keep in mind with elderly patients is the increased risk of delirium from anticholinergic agents, which often are used in combination with opioids (e.g., Demerol plus Vistaril) or with anesthesia to reduce secretions. These should be avoided if possible.

AGING CHANGES THAT INCREASE SURGICAL RISK

Aging in healthy individuals is associated with a roughly linear loss of function in all organ systems, although the rate of functional loss varies greatly between individuals, and even between organ systems in the same individual. These changes lead to a loss of homeostatic reserve but do not ordinarily alter surgical risk significantly if they are considered appropriately and adjustments are made in the treatment plan, especially with respect to medication regimens. The two most important points in regard to medications are as follows. (1) Drug pharmacokinetics (what the body does to the drug) change significantly with aging and drug dosing must be adjusted for this. (2) Although aging per se is not an independent risk factor for adverse drug reactions, older persons tend to be on multiple medications, which does increase the risk of adverse drug reactions. Drug regimens must be reviewed thoroughly for potential drug interactions, and all unnecessary medications must be avoided.

Cardiac output may be maintained in active healthy elders by an increased stroke volume compensating for diminished heart rates in aging. Older persons, however, do not tolerate surgical blood loss or hypovolemia as

well as younger persons. Pulmonary function declines, which increases the risk of hypoxemia, decreased clearance of secretions, pneumonia, and diaphragmatic breathing. Renal function declines, leading to decreased clearance of water, salt loads, or renally excreted drugs. It is especially important to avoid nephrotoxic drugs in elderly persons. Wound healing may be impaired in the elderly, especially in the presence of hypoxemia, hypovolemia, anemia, malnutrition, catabolic states, diabetes mellitus, peripheral vascular disease, corticosteroids, chemotherapy, radiation therapy, or tissue damage resulting from surgery.[36] The most critical factors appear to be adequate circulating volume and tissue perfusion.

Elderly patients are at higher risk of malnutrition from multiple causes, and the risk is exacerbated by the stress of serious illness or major surgery. Nutritional status should be assessed based on current weight and oral intake, history of weight loss, and estimated nutritional requirements. Malnutrition should be sought and treated aggressively. Peripheral total parenteral nutrition is an option; confused elderly patients do not tolerate nasogastric tube feedings well. Elderly persons typically also have low cardiopulmonary reserve and are at high risk of deconditioning. They need to be mobilized as early as possible to prevent this as well as to improve pulmonary function and decrease the risk of deep venous thrombosis. Numerous factors act to increase the risk of pressure ulcers greatly in elderly postoperative patients, and extra surveillance and precautions are needed to avoid them. They are preventable, and their appearance represents a failure in patient management.

PERIOPERATIVE RISK ASSESSMENT (Table 2)

Most of the excess surgical risk in the elderly is owing to comorbid conditions and higher rate of emergency procedures. At least five organ systems should be screened for pre-existing disease requiring more in-depth evaluation: (1) cardiac, (2) pulmonary, (3) renal, (4) hepatic, and (5) central nervous system. History taking should focus on these systems as well as on current functional status. Because of the high incidence of perioperative delirium, mental status should be assessed preoperatively, preferably with a standardized test.

Table 2. AGE-ASSOCIATED FACTORS THAT INCREASE PERIOPERATIVE AND POSTOPERATIVE RISK

Factors	Comments
Decreased physiologic reserve in multiple organ systems	Susceptible to cardiovascular complications, hypoxia, pneumonia, renal insufficiency
Altered pharmacokinetics	
Polypharmacy	
Malnutrition	
Immobility, deconditioning	Pressure sores, falls
Delirium	Restraints

Because of sensory deficits and slowed cognitive processing associated with advanced age, extra time should be allowed to explain the proposed procedure, assure adequate understanding, and obtain informed consent. Advance directives should be discussed and clarified if needed. Many patients have written Do Not Resuscitate (DNR) orders. Because surgery with general anesthesia is, in effect, a controlled resuscitation, and because of the treatable nature of many problems leading to cardiopulmonary arrest in the perioperative period, the patient's DNR status should be rescinded temporarily (e.g., for the perioperative period).[39]

Physical examination should include orthostatic blood pressure measurements and a careful neurologic examination, in addition to the usual components. Laboratory evaluation is controversial but the authors believe a reasonable assessment includes serum electrolytes. Blood urea nitrogen (BUN), creatinine, complete blood cell count, prothrombin time and partial thromboplastin time, drug levels for drugs that are monitored, routine urinalysis, electrocardiogram (ECG), and a chest radiograph. Table 3 illustrates general guidelines for when to stop medications before surgery.[7] In addition to these guidelines, patients with moderate to severe Parkinson's disease present particular problems with their medication management during the perioperative period, and specialty consultation may be needed.

CARDIAC RISK ASSESSMENT

The cardiac risk associated with noncardiac surgery is primarily owing to clinically silent

Table 3. WHEN TO STOP MEDICATIONS PREOPERATIVELY

Medication	Length of Time Prior to Surgery that Medication Should Be Stopped
Monoamine oxidase inhibitors	2 weeks
Guanethidine	2 weeks
Aspirin	7 days
Ticlopidine	7 days
Long half-life nonsteroidal anti-inflammatory drugs	7 days
Warfarin	3–5 days
Short half-life nonsteroidal anti-inflammatory drugs	2–3 days
Antidepressants	3–7 days
Antipsychotics	Taper & stop several days prior
Benzodiazepines	Taper & stop several days prior
Lithium	Taper & stop several days prior
Oral hypoglycemics	1 day
Diuretics	1 day
Potassium supplements	1 day
Digoxin (unless needed for rate control)	1 day

or apparently stable coronary artery disease (CAD) that is unmasked by the stress of surgery. This risk is determined by type of procedure and patient risk factors. Intra-abdominal surgery is the procedure of most concern for urologists, and usually is classified as intermediate risk. The patient population treated by urologists (largely elderly men), however, has a high prevalence of underlying CAD.

A combination of history, physical examination, and laboratory data often is used to compute aggregate cardiac risk assessment scores. The most commonly used is the Goldman Cardiac Risk Index for classification of perioperative cardiac complications in persons undergoing noncardiac surgery (Table 4).[15] Nine independent predictive variables for the risk of cardiac complications (MI, pulmonary edema, ventricular tachycardia) with a prospective sample of 1001 consecutive general surgery patients were evaluated. Four classes of progressively higher risk were defined, as illustrated in Table 4.

The Goldman Risk Index has been modified to define better the cardiac risk factors derived from the history and to make the scoring easier to use.[3] Unfortunately, neither index is sensitive for detecting significant CAD in low- and intermediate-risk persons who develop cardiac problems perioperatively. This is true especially for elderly and vascular surgery patients. In addition, combining the three cardiac complications together reduces its usefulness because different approaches are needed for prevention, detection, and treatment.

CAD AND MI

The incidence of postoperative MI has been looked at in a large sample of male veterans, average age 65.5 years, undergoing major noncardiac surgery.[2] Patients were classified into four strata based on criteria for CAD. High risk included those with a high probability of CAD based on one or more of the following: history of MI or ECG evidence of MI, typical angina, angiographically documented significant CAD, or previous coronary artery bypass graft (CABG). Intermediate risk included one or more of the following: history of stroke or transient ischemic attack, history of peripheral vascular surgery for atherosclerosis, claudication, carotid bruit, or atypical chest pain. Low risk included one or more of the following: high atherogenic risk profile or age greater than 75 years. Negligible risk included none of the above. The incidence of MI was 4.1% in the high-risk group, 0.8% in the intermediate-risk group, and 0% in the low- and negligible-risk groups. None of the patients who underwent urologic surgery experienced an MI, regardless of CAD risk. Multivariate analysis showed that besides the presence of CAD, age greater than 75 years, signs of congestive heart failure (CHF) preoperatively, and a planned vascular surgery also were associated independently with postoperative MI. There are two points to emphasize. (1) All postoperative MIs occurred in those in whom CAD was obvious on preoperative evaluation, or in those with evidence of peripheral vascular disease. (2) Even in the high-risk

Table 4. COMPUTATION OF THE CARDIAC RISK INDEX

Category	Criteria	Points*
History	A. Age >70 y	5
	B. MI in previous 6 mo	10
Physical examination	A. S3 gallop or JVD	11
	B. Important valvular aortic stenosis	3
ECG	A. Rhythm other than sinus or PACs on last preoperative ECG	7
	B. >5 PVCs/min documented at any time before operation	7
General status	Pao_2<60 or Pco_2>50 mm Hg, K>3.0 or Hco_2<20 MEq/L, or BUN>50 or Cr>3.0 mg/dL, or abnormal aspartate aminotransferase, or signs of chronic liver disease, or patient bedridden from noncardiac causes	3
Type of surgery	A. Intraperitoneal, intrathoracic, or aortic surgery	3
	B. Emergency procedure	4
Total possible score		53

From Goldman L, Caldera DL: Multifactorial index of cardiac risk in non-cardiac surgical procedures. NEJM 297:848, 1977; reprinted by permission of the New England Journal of Medicine, Massachusetts Medical Society.

*Classes of cardiac risk: I (0–5 points) = minimal; II (6–12 points) = low; III (13–25 points) = moderate; IV (>25 points) = high.

group, the incidence of postoperative MI was quite low.

The authors suggest the following approach for patients with CAD undergoing urologic surgery. Patients who are low risk or less can proceed with surgery. Patients with higher risk can be classified further by their functional capacity (including those with stable angina).[14] Those with good exercise tolerance either by reliable history or performance on exercise testing have low risk of perioperative MI and may proceed to surgery after optimization of their medical regimen. For those unable to exercise, noninvasive testing may be indicated. This involves most commonly dipyridamole-thallium scintigraphy, but may involve dobutamine stress echocardiography or ambulatory ischemia monitoring. If the results of such testing are negative, the patient may proceed to surgery after optimization of their medical regimen. If the results are positive, options include optimizing medical therapy and reassessing with noninvasive testing, proceeding to surgery with aggressive monitoring and treatment, defering the surgery, choosing a lower risk surgical procedure, or refering for coronary angiography followed by a revascularization procedure if indicated, before surgery.[14] Very high-risk patients have unstable coronary syndromes or recent uncompensated heart failure and should not undergo elective surgery.

This approach is based on the fact that the risk of death from cardiac causes, 0% to 2%, is less than that associated with CABG (2.6%).[10] A caveat is that not all cardiac deaths follow an MI, and this approach may miss these cases. The exact approach needs to be determined on an individual basis. Certainly the medical regimen needs to be optimized in all patients prior to surgery.

Postoperative MI has a high mortality rate (27% to 80%); mortality is much higher in those with a history of previous MI, and half the deaths occur suddenly owing to arrhythmias. Incidence peaks on the third to fifth postoperative days. Surgery patients with evidence of CAD are candidates for postoperative monitoring for myocardial ischemia, although this is still controversial. The presentation is different from MI in the medical patient; chest pain is present in the minority (13% to 50%). Other presentations include CHF, hypotension, ventricular or supraventricular arrhythmias, or no signs or symptoms (22% to 50% are silent). Any postoperative patient demonstrating compatible signs or symptoms should immediately be admitted to a critical care unit for close monitoring. Management of postoperative MI is similar to that in the medical patient. Although thrombolytic therapy is not an option, angioplasty is.

CHF

Loss of cardiac pump function leading to CHF significantly increases perioperative risk. Although postoperative CHF occurs in only about 1% to 6%, the associated mortality is 15% to 20%.[3,9] During surgery volume changes and other intraoperative stressors as well as myocardial depressant actions of anesthetic agents can lead to a significant de-

crease in cardiac output. Following surgery for approximately 48 hours is when most sequestered fluid is mobilized, placing an increased load on the heart. It also is a period of greatly increased metabolic and neurohumoral stress. Most (70%) postoperative CHF occurs within 1 hour following surgery, and in half of these cases inappropriate fluid administration is a major factor.

Preoperatively, the risk of surgical mortality during general surgery increases directly with New York Heart Association (NYHA) functional class.[41] Mortality was 4% in NYHA Class I, 11% in Class II, 25% in Class III, and 67% in Class IV. Goldman et al[13] found little increased risk with NYHA Classes I and II, but substantial risk with Class III or IV. Preoperative CHF not only increases the risk of cardiac perioperative complications, but also increases the risk of noncardiac pulmonary complications.[14] The most important signs from physical examination are the presence of increased jugular venous pressure and an S3 gallop. Treatment for CHF should be optimized preoperatively, which depends on the cause. If emergent surgery is needed for someone with severe CHF, hemodynamic monitoring with a pulmonary artery catheter is recommended, which should extend at least 48 hours postoperatively to guide fluid management.

CARDIAC ARRHYTHMIAS

Frequent premature ventricular contractions are thought to be a risk factor for perioperative cardiac complications in those with underlying heart disease. Otherwise healthy persons without evidence of heart disease after full evaluation probably do not have increased risk. In a study of 230 high-risk men with an average age of 68 years undergoing major noncardiac surgery, half had more than 30 premature ventricular contractions/hour or nonsustained ventricular tachycardia in the perioperative period. Half of these persons had similar arrhythmias on preoperative ambulatory monitoring. Importantly, the presence of these ventricular arrhythmias preoperatively did not predict serious ventricular arrhythmias perioperatively.[31] The occurrence of new ventricular arrhythmias may signal an acute cardiac event, but without evidence of myocardial ischemia, aggressive monitoring or treatment is not warranted. Prophylactic preoperative or intraoperative lidocaine therapy can be reserved for patients with a history of symptomatic ventricular arrhythmias or history of sudden death.

Patients with bifasicular blocks with or without a prolonged PR interval or atrial fibrillation have an increased risk of developing complete heart block during long-term follow up; however, the risk of developing complete heart block perioperatively is less than 1%. In patients with sick sinus syndrome the risk may be higher but prophylactic pacemakers should be reserved for those patients who need pacemakers chronically.

The most frequent arrhythmias encountered preoperatively are supraventricular tachyarrhythmias, the most common being atrial fibrillation. Tachyarrhythmias in the perioperative period often lead to hemodynamic compromise, especially in the presence of aortic stenosis or hypertrophic cardiomyopathy, and are tolerated poorly in the elderly. Several issues need to be considered. First, the cause should be assessed. Thyrotoxicosis or significant associated cardiac abnormalities should be excluded. Recent onset of atrial fibrillation or flutter should prompt an assessment for associated acute medical conditions, such as pulmonary, infectious, or metabolic conditions. Second, consideration should be given to cardioversion of atrial fibrillation before surgery, especially if it is coarse, not long-standing, and left atrial size is normal or only mildly enlarged. Atrial flutter is an unstable rhythm that should be converted prior to surgery. Third, systemic anticoagulation may be needed prior to cardioversion, which may greatly increase the time before needed surgery. Also, systemic anticoagulation is needed by many of these patients chronically, and needs to be managed in the perioperative period. Fourth, the ventricular response in atrial fibrillation needs to be considered. Slow ventricular response with atrial fibrillation in the absence of digoxin therapy may indicate sick sinus syndrome and the potential for both the inability to develop an adequate ventricular rate during perioperative stress with subsequent hemodynamic compromise and predisposition to tachyarrhythmias, which may be poorly tolerated.

Preoperative atrial arrhythmias predict perioperative atrial arrhythmias, the most common of which are atrial flutter and fibrillation (70%).[4] Postoperative atrial arrhythmias are associated with a significant mortal-

ity, mainly owing to acute underlying problems, such as cardiopulmonary disorders, infections, hypo- or hypervolemia, anemia, or hypoxia.[8] Supraventricular tachyarrhythmias may lead to rapid hemodynamic compromise and treatment should address any known precipitating factors as well medications to control the ventricular response. Digoxin may not provide a rapid enough response; drugs such as verapamil or esmolol usually are effective, but close attention must be paid to hemodynamic parameters.

VALVULAR HEART DISEASE

Significant valvular heart disease does increase the risk of perioperative cardiac complications. Of those with important valvular disease, about 20% develop new or worsening heart failure, usually precipitated by supraventricular tachycardia. Valvular aortic stenosis is particularly likely to cause problems with perioperative fluid management. In patients with significant aortic stenosis and symptoms of angina, heart failure, or syncope, all but emergency surgery should be avoided and cardiac catheterization is indicated. If catheterization shows severe aortic stenosis, aortic valve replacement should precede other surgeries. If the aortic stenosis is not critical, or if the patient has no cardiac symptoms, the patient usually can undergo general surgery. Some of these patients may benefit from hemodynamic monitoring with pulmonary artery and intra-arterial catheters kept in place for 24 to 48 hours postoperatively to guide fluid management. Patients with mitral valve prolapse are probably not at increased risk unless they have significant associated mitral regurgitation. Patients with prosthetic heart valves do have a higher risk of perioperative cardiac complications.

HYPERTENSION (HTN)

HTN is one of the most common chronic medical conditions in elderly persons, and the stressors of anesthesia, laryngoscopy or intubation, and surgery might be expected to worsen blood pressure (BP) control. Severe uncontrolled HTN does increase the risk of BP lability and hypotension intraoperatively, associated with evidence of myocardial ischemia, and hypertensive episodes postoperatively. Mild to moderate preoperative diastolic HTN (diastolic BP less than 110 mm Hg), however, is not associated with perioperative complications and need not delay surgery, although it is associated with larger absolute BP drops during surgery.[16] Such patients should be monitored closely during surgery and perioperatively for both hypotensive or hypertensive episodes. If there is time, however, BP should be optimized beforehand, with a target BP of less than 160/90. Little data are available for systolic HTN but persons with systolic BP greater than 200 mm Hg or diastolic BP greater than 110 mm Hg, or persons with symptoms (especially encephalopathy) should have their BP controlled before elective surgery.

Preoperative evaluation should document the cause and any end organ damage. Because continuation of BP medications decreases intraoperative BP lability, BP medications should be given the morning of surgery with a sip of water. If a prolonged period of no oral intake is anticipated, clonidine should be withdrawn well ahead of surgery or converted to a transdermal patch route. Beta blockers should be continued, intravenously if necessary.

Similar to CHF, postoperative HTN has two peaks. An early peak occurs within 30 to 60 minutes after the end of anesthesia and commonly is precipitated by pain, excitement, discomfort from an endotracheal tube, hypoxia, hypercapnia, hypothermia, or fluid overload. These should be assessed and treated appropriately. Further treatment, if necessary, can be accomplished with intravenous (IV) boluses of drugs, such as labetalol, hydralazine, or enalaprilat, or with continuous IV infusions of a calcium channel blocker (e.g., nicardipine). For severe hypertensive episodes IV nitroprusside is the best choice because of its quick onset of action and short half-life that permits rapid titration of effect; IV nitroglycerine is an alternative especially in those with active coronary artery disease.

The second peak of postoperative HTN occurs between 24 to 48 hours when the patient is mobilizing fluids. This is managed best with diuretics. Chronic antihypertensive medication should be restarted in the hospital for patients with a history of HTN.

ANTIBACTERIAL PROPHYLAXIS

Endocarditis

The need for antibacterial prophylaxis is classified by two factors: (1) patient factors

including the site at risk (e.g., heart valves), type of lesion, and risk of infection; and (2) type of procedure (site of procedure, degree and type of bacteremia produced by the procedure). There is strong consensus for the need for endocarditis prophylaxis for a variety of cardiac abnormalities; however, there are other patient conditions that may justify antibacterial prophylaxis but for which clear consensus has not yet been reached (Table 5).[18] Decisions for prophylaxis for these conditions should be made individually depending on the specific condition and anticipated procedure.

Endocarditis prophylaxis in genitourinary procedures is aimed at enterococci, and antibiotic regimens should cover this organism. About 15% of all cases of endocarditis have a genitourinary source, and this is the portal of entry for 20% to 50% in patients with enterococcal endocarditis.[34, 45] Gram-negative organisms also need to be covered in those persons with prosthetic heart valves. Transient bacteremias are common following genitourinary procedures; 8% following urethral catheterizations, 24% after urethral dilatations, 17% after cystoscopies, and 12% to 31% following transurethral resections of the prostate.[32] Bacteremia generally occurs within 1 to 5 minutes of instrumentation, and clears by 15 minutes following instrumentation. The frequency of bacteremia is several times higher in those with infection at the instrumented site. Hence, the importance of antibacterial prophylaxis and timing of the regimen.

Specific genitourinary procedures for which endocarditis prophylaxis is recommended are listed in Table 6. In general, prophylaxis for genitourinary procedures should be given parenterally with close attention paid to timing of doses. Note that many patients requiring endocarditis prophylaxis are also anticoagulated. These patients require IV infusions because intramuscular injections are relatively contraindicated. Alternatively, there is a low-risk oral regimen for low-risk procedures in clearly low-risk patients. Again, this depends on individual patient and procedural factors. Note also that urethral catheterization in an uninfected patient is not considered a high-risk procedure requiring prophylaxis despite the documented frequency of bacteremia following this procedure. It would be prudent, however, to avoid this procedure as much as possible in high-risk patients (e.g., those with prosthetic heart valves or previous history of endocarditis), or to prophylax such patients. Table 7 lists antibacterial regimens.

Table 5. CARDIAC CONDITIONS FOR WHICH ENDOCARDITIS PROPHYLAXIS IS RECOMMENDED*

Prosthetic cardiac valves, including bioprosthetic and homograft valves
Previous bacterial endocarditis, even in the absence of heart disease
Most congenital cardiac malformations
Rheumatic and other acquired valvular dysfunction, even after valvular surgery
Hypertrophic cardiomyopathy
Mitral valve prolapse with valvular regurgitation

*Not meant to be all-inclusive.

From Dajani AS, Bisno AL, Chung KJ, et al: Prevention of bacterial endocarditis: Recommendations by the American Heart Association. JAMA 264:2919, 1990; with permission.

Table 6. GENITOURINARY PROCEDURES FOR WHICH ENDOCARDITIS PROPHYLAXIS IS RECOMMENDED

Cystoscopy
Urethral dilatation
Urethral catheterization if urinary tract infection is present*
Urinary tract surgery if urinary tract infection is present*
Prostatic surgery
Incision and drainage of infected tissue*

*In addition to prophylactic regimen for genitourinary procedures, antibiotic therapy should be directed against the most likely bacterial pathogen.

Adapted from Dajani AS, Bisno AL, Chung KJ, et al: Prevention of bacterial endocarditis: Recommendations by the American Heart Association. JAMA 264:2919, 1990; with permission.

Wound Infection

The risk of local wound infection varies with the site of surgery, degree of potential contamination, and various host and provider factors. Patient risk factors include obesity, coincident infection at another site, diabetes mellitus, age greater than 60 years, malnutrition, chronic underlying disease, cancer, radiation therapy, immunosuppressive therapy, prolonged preoperative hospital stay, and nasal carriage of *Staphyloccus aureus*. Provider risk factors include longer duration of surgery, inexperience with the procedure, local preoperative skin preparation factors, use of drains, insertion or presence of foreign body or implant, repeat operation (especially during the same hospitalization), and presence of hematoma.[3, 46]

Table 7. STANDARD ENDOCARDITIS REGIMENS FOR GENITOURINARY/GASTROINTESTINAL PROCEDURES

Regimen Type	Dosage Regimen
Standard	IV or IM ampicillin 2.0 g, plus gentamicin 1.5 mg/kg (not to exceed 80 mg) 30 min before procedure; followed by amoxicillin 1.5 g orally 6 h after initial dose; alternatively, the parenteral regimen may be repeated once 8 h after initial dose
Penicillin-allergic patient regimen	IV vancomycin 1.0 g over 1 h, plus IV or IM gentamicin 1.5 mg/kg (not to exceed 80 mg) 1 h before procedure: may be repeated once 8 h after initial dose
Alternate low-risk patient oral Regimen	Amoxicillin 3.0 g orally 1 hr before procedure; followed by 1.5 g Given 6 h after initial dose

IM = intramuscularly.

The timing of prophylactic antibiotics is important—they need to be given preoperatively within 2 hours of surgery for maximum effect, and they should not be continued beyond 48 hours postoperatively.[5] There are some data indicating that prophylactic antibiotics also reduce wound infection rates in clean surgeries, but with less evidence of benefit.[34,46] The literature relating specifically to urologic surgeries is sparse and inconclusive.[20] First generation cephalosporins (e.g., cefazolin) are the drugs of choice for surgical-wound prophylaxis.

PULMONARY FUNCTION

Postoperative pulmonary complications include atelectasis, pulmonary infiltrates or pneumonia, pleural effusions, pulmonary embolism, respiratory depression with hypoxemia or hypercarbia, adult respiratory distress syndrome, respiratory failure, and ventilator dependence. Preoperative risk factors include age greater than 70 years, acute or chronic pulmonary disease, hypercapnia, upper abdominal or thoracic surgery, vertical (versus horizontal) laparotomies, smoking (greater than 20 packs per year history), obesity, and duration of anesthesia more than 3.5 hours. Spinal and general anesthesia carry the same risk, although regional anesthesia does appear to be safer.[44] The further away the surgical incision is from the diaphragm the less the risk of pulmonary complications (excluding pulmonary embolism). Such complications rarely occur after urologic procedures, although the risk after renal surgery is not clear.[51]

The most important aspects of assessment are the history and physical examination. History should focus on the presence of acute and chronic respiratory conditions, exercise tolerance, and smoking history. Patients with better exercise tolerance (ability to walk greater than two blocks without dyspnea) or walking distance (ability to walk greater than 400 m in 12 minutes) by self-report clearly had fewer postoperative pulmonary complications, although the power of this study was limited.[36] It appears, however, that poor exercise tolerance is a major risk factor for both postoperative cardiac and pulmonary complications and that good exercise tolerance is protective, even in the face of other significant risk factors. Pulmonary complications often occurred in those with cardiac complications, suggesting that focusing on preventing cardiac complications may reduce pulmonary complications significantly.

In patients with uncharacterized pulmonary disease or significant risk factors, especially in the case of a prolonged or extensive surgery or if a strenuous postoperative rehabilitation program is anticipated, spirometry is indicated. If obesity or severe obstructive or restrictive lung disease are present arterial blood gases also should be done. Surgery should be postponed in the presence of an upper or lower respiratory infection to reduce the risk of bronchospasm. Smoking cessation should occur at least 8 weeks prior to surgery to reduce the risk of pulmonary complications, but cessation for 12 to 72 hours also normalizes several important carbon monoxide-induced changes affecting cardiovascular function.[33] Optimization of treatment for chronic pulmonary disease is critical and some patients require an increase (or addition) in steroid dose for 1 to 2 weeks preoperatively. Preoperative bronchodilator therapy also should be considered in those with a forced vital capacity less than 1 L, or a forced expiratory volume in one second less than 500 cm^3, especially if improvement is seen with treatment. Preoperative education on

deep-breathing techniques, coughing, and incentive spirometry should be given. The presence of hypercapnia (P_{CO_2} > 45 to 50 mm Hg), with or without hypoxemia, predicts high risk and every effort should be made to treat any potentially reversible factors.

Postoperatively the most important intervention is early ambulation. Even if nonambulatory, it is important to get the patient out of bed and into a chair, if possible, because this prevents some deterioration in anti-gravity muscle function. It also is important for the patient's psychological well-being. Pain control is important but patients given narcotics must be monitored carefully for respiratory depression and sedation, and specifically instructed to deep breathe and cough. Lung expansion maneuvers, such as incentive spirometry, intermittent positive-pressure breathing, continuous positive airway pressure, or deep-breathing exercises mostly benefit high-risk patients with thoracic or upper abdominal surgery, with unclear benefit in other groups, but are recommended with lower abdominal surgery lasting longer than 3 hours.[31] Chest physiotherapy is beneficial mainly for patients with lobar atelectases or high sputum production rates. Nasogastric tubes should be removed as soon as possible because one study demonstrated that use of a nasogastric tube for more than 24 hours postoperatively was the strongest predictor of pulmonary complications. Bronchodilators and other treatments should be used to reduce bronchospasm and to optimize treatment of chronic pulmonary conditions. Adequate prophylaxis for deep venous thrombosis (DVT) should be instituted. Morbidly obese patients with even mild preoperative hypoxemia should have oxygenation closely monitored postoperatively, with intensive pulmonary therapy.

DIABETES MELLITUS

Glucose control and adequate insulin levels are important for wound healing and an adequate immune response. Surgical and metabolic stressors increase circulating levels of adrenal glucocorticoids, catecholamines, and growth hormone, which increase insulin resistance and frequently result in hyperglycemia in persons with impaired glucose tolerance. Diabetes is also a common problem in older persons, most of which is noninsulin-requiring and treated with oral hypoglycemics or diabetic diet. Neither usually presents a problem. The oral hypoglycemic medication should be stopped 1 day before surgery, with capillary blood glucose levels monitored and covered with a regular Humulin insulin sliding scale. A reasonable target range for blood glucose is 180 to 200 mg/dL. The oral hypoglycemic should be restarted at the time of discharge. A rising insulin requirement may signal infection.

Surgery for diabetics on insulin should be scheduled first thing in the morning. One third to one half of their usual morning insulin should be given preoperatively as intermediate or long-acting insulin. D5W is started at 100 mL/hour and continued into postoperative recovery. Capillary blood glucose levels are checked perioperatively with regular insulin sliding scale coverage every 4 to 6 hours. For minor procedures the remainder of the patient's usual insulin dosage can be given once they are awake and ready to eat. For major procedures or extended recovery the D5W infusion should be continued and monitored with sliding-scale insulin coverage. Alternatively, a constant infusion of insulin by pump of 1 to 2 units/hour can be started, along with D5W at 100 mL/hour. The target range for blood glucose should be 150 to 250 mg/dL. When the glucose level falls below 150 mg/dL the insulin rate should be reduced to 0.1 units/hour, but not stopped. When the glucose level rises above 250 mg/dL the D5W can be stopped, the insulin rate increased, or both. Regular subcutaneous insulin should be on board at least 2 hours before the insulin infusion is stopped.

ADRENAL INSUFFICIENCY

Many older persons take supraphysiologic doses of prednisone (5 mg/day, 7.5 to 10 mg daily for 1 month, or greater than 20 mg/day for 1 week, during the past year) for a variety of conditions. These persons may have suppression of the hypothalamic-pituitary-adrenal axis and require stress doses of steroids perioperatively. One way to identify these persons is to do a cosyntropin stimulation test. The patient is given 0.25 mg of cosyntropin IV or IM and serum is drawn at zero time and 45 minutes for cortisol levels. The axis is adequate if the 45-minute cortisol level is above 20 μg/dL. If stress dose steroids are needed the following schedule is recommended:

Major surgery
Hydrocortisone hemisuccinate, 100 mg IV bolus every 6 to 8 hours for 72 hours, starting preoperatively.
Minor surgery
Same schedule as for major surgery but for only 24 hours.
Ambulatory surgery
Hydrocortisone hemisuccinate, 100 mg IV or IM at time of discharge, with prescription for a rapid taper of prednisone or resumption of previous medications.
Minor procedure
Hydrocortisone hemisuccinate, 100 mg IM in singe dose before procedure.

ANTICOAGULATION AND DVT PROPHYLAXIS

DVT is prevalent in major surgery, including urologic surgery. Clot in the deep venous system of the lower extremities can be documented by radioactive fibrinogen scanning in over 40% of surgical patients. Half of these patients have no physical findings; one third of patients with DVT suspected clinically do not have DVT. The usual signs and symptoms of DVT (calf pain or tenderness, edema, cord, Homan's sign) are unreliable and the diagnosis must be confirmed by imaging study. Frequent symptoms are a constant cramping or heaviness in the leg. After the diagnosis is confirmed (or before if there is a delay in obtaining imaging studies) full-dose heparinization is begun and continued for 5 to 7 days. Once on therapeutic heparin (activated partial thromboplastin time [APTT] 1.5 to 2.0 times normal) warfarin can be started and adjusted to maintain an international normalized ratio of 2.0 to 3.0. The patient should remain at bedrest for several days even with a therapeutic APTT to allow fixation of the clot to the vessel wall. Warfarin therapy should be maintained for 4 weeks if there is no other predisposing risk factor for DVT other than surgery.[35]

Because urologic surgery is high risk for clot formation, DVT is hard to diagnose and difficult to treat, and the potential complications of pulmonary emboli and postphlebitic syndrome are associated with significant morbidity and mortality, the best plan is to try to prevent it in the first place. All urologic surgery in the geriatric population must be considered high risk and warrants some form of DVT prophylaxis. Two commonly used regimens are low-dose heparin and external pneumatic compressive devices, or both. Fixed low-dose heparin consists of 5000 units of heparin subcutaneously every 8 to 12 hours beginning 2 hours before surgery and continuing until the patient is ambulatory. A study involving major abdominal surgery using low molecular weight heparins instead of standard heparin showed similar efficacy but lower bleeding rates.[35] Although use of low molecular weight heparins may become the method of choice, differences between them and problems assessing activity, as well as unclear cost benefit ratios preclude making a general recommendation at this time. External pneumatic compression stockings are started at surgery and continued until the patient is ambulatory.

The approach to patients who are anticoagulated for medical reasons depends on the degree of embolization risk. Low-risk patients can have their warfarin stopped 3 to 5 days prior to surgery. A protime should be measured 1 to 2 days prior to surgery and vitamin K given if necessary. High-risk patients, such as those with mechanical heart valves, should have their warfarin stopped 4 to 5 days prior to surgery and full dose heparinization started. Heparin can be stopped 6 hours prior to surgery and then restarted 12 to 24 hours after surgery. A protime should be checked 1 day prior to surgery and vitamin K given if necessary—0 to 3 mg generally is sufficient. More than this may result in the patient being relatively refractory to warfarin after surgery, and result in a prolonged hospitalization. Many high-risk patients also take aspirin, which should be stopped 7 days before surgery.

GENERAL PRINCIPLES FOR POSTOPERATIVE CARE

Once the patient is stable, awake, and eating, efforts to mobilize should begin. This helps to prevent DVT, deconditioning, constipation, pressure sores, and pulmonary complications, as well as to maintain function—a critical goal in the elderly. A relatively short period of time at bedrest for a frail elderly patient may result in profound deconditioning and loss of function, resulting in prolonged hospitalization or a preventable nursing home stay. Physical and occupational therapy consults should be obtained early, if needed. For patients returning to indepen-

dent living, a focus on activities of daily living is especially important. The home situation, functional requirements, and availability of needed social support should be known beforehand, and anticipated services should be arranged well before discharge. Discharge planning should start at the time of admission.

Indwelling bladder catheters should be discontinued as early as possible and not left in place for convenience until the time of discharge. This reduces the chance of infection and problems with voiding after the catheter is removed. It also gives time for a bladder retraining program, if needed. Oral intake is very important following surgery. Older persons lying in bed following surgery may not have much of an appetite, especially for hospital food, even if they had excellent appetites before surgery. They may be weak, sedated, and confused, and require supervision and encouragement, if not actual assistance, to eat. Supplements may be needed but should be given after meals or at night to avoid interfering with appetite for regular meals. Diet preferences may be elicited by a dietician, with food possibly brought in by family or friends. Nutritional status needs to be monitored closely.

Older persons, especially if with some degree of cognitive impairment or dementia, are very susceptible to postoperative confusion or delirium. This is discussed in the next section. There are, however, some simple environmental manipulations that can lessen disorientation. These include the use of clocks, calendars, nightlights, photographs of family or friends, or trying to maintain the patient's usual routine, such as watching certain television programs every night and brushing teeth at the same time. Making sure hearing aids work is important, as is minimizing environmental noise and disturbances. Frequent visits from family or friends may also be helpful.

POSTOPERATIVE DELIRIUM

Acute confusional states, or delirium, are extraordinarily common postoperatively in elderly persons. The incidence varies with the type of surgery from about 15% of elderly general surgery patients to over 50% of orthopedic patients at sometime during their stay.[37] Another source lists aortic aneurysm surgery as highest risk for postoperative delirium with a frequency of 41%; frequencies for orthopedic and abdominal surgeries are 9% and 5%, respectively.[38] Delirium always has a medical cause, which requires further workup. The poor prognosis associated with delirium is most likely owing to these underlying medical conditions, but delirium itself also may be a factor. Delirium may be partially or totally irreversible, and improvement in cognitive function, if it occurs may take many months.[12]

The hallmarks of delirium are acute onset of decreased attention span and fluctuating course. The patient is distractable and may be rambling or incoherent. Delusions or hallucinations may be present, as may marked emotional lability or altered level of consciousness. The patient may be agitated or withdrawn. With treatment of the underlying cause periods of confusion and agitation generally diminish in frequency and duration. Delirium is compounded by sensory losses, such as vision and hearing, which are common in the elderly and which impair communication and increase the confusion. This may lead to the inappropriate use of psychotropic medications, often worsening the confusion. The medical causes of delirium that should be considered in the differential diagnosis of new cases include:

- Drug intoxications
  - Anticholinergics, sedative-hypnotics, analgesics, cardiovascular agents
- Drug withdrawal
  - Sedative-hypnotics, alcohol
- Metabolic disturbances
  - Hypoglycemia, dehydration, electrolyte imbalances, acid-base disturbances, hepatic or renal failure or endocrinopathies, nutritional or vitamin deficiency
- Acute cerebral disorders
  - Stroke, cerebral edema, trauma, seizure, fat emboli
- Infections
  - Pneumonia, bacteremia
- Hemodynamic disturbances
  - Hypovolemia, hypotension (myocardial infarction, arrhythmias)
- Respiratory disorders
  - Hypoxia (pulmonary embolus)

Table 8 lists risk factors with their respective odds ratios for delirium in hospitalized elderly patients.[40]

The management of acute delirium includes prompt assessment and correction of underlying causes.[11,40] Any unnecessary medications should be discontinued. The possibility of sedative or alcohol withdrawal should

Table 8. RISK FACTORS FOR DELIRIUM IN HOSPITALIZED ELDERLY PATIENTS

Risk Factor	Odds Ratio
Prior cognitive impairment	9.0
Fracture on hospital admission	6.6
Age > 80 years	5.2
Use of neuroleptics	4.5
Systemic infection	3.0
Narcotic use	2.5
Male gender	2.4

From Schor JD, Leukoff SE, Lipsitz LA et al: Risk factors for delirium in hospitalized elderly. JAMA 267:827, 1992; with permission.

be considered. Environmental manipulations, as discussed previously, and continuity of caregivers may help. Close supervision is important because delirious patients are apt to get out of bed without regard to IV poles, bandages, etc. Physical restraints are likely to add to confusion and agitation. If pharmacologic management is acutely needed, haloperidol can be used. Lorazepam often is also used to produce sedation. Initial doses for both haloperidol and lorazepam should not exceed 0.5 mg for either via oral, IM, or IV routes. Lorazepam also can be given sublingually for those who cannot take it orally. Note that in some individuals these small doses produce excessive sedation, and close monitoring and dose titration are required.

POSTOPERATIVE FEVER

Fever during the perioperative period is common. The absence of fever in elderly persons, however, does not necessarily indicate the absence of significant infectious processes, because those who develop nosocomial infections may do so without significant fever, leucocytosis, or physical signs, especially if immunocompromised from other causes.[30] Early postoperative fever (within the first 72 hours) often is owing to the effects of general anesthesia and not owing to infection.[30] Exceptions are cellulitis owing to group A streptococcus and clostridial myonecrosis (gas gangrene), both of which should be recognized easily. The most common causes of fever in the late postoperative period are infection (wound infection, abscess, pneumonia, line sepsis, urinary tract, antibiotic-associated colitis), drug fever, DVT and pulmonary emboli, MI, gout or pseudogout, and transfusion reactions.

Drug fever often goes unrecognized. Classically, drug fever is recognized by the use of a drug that is a potential sensitizer, high fevers (102 to 106° F) with nontoxic appearance, relative bradycardia (which may be absent in elderly persons or those with pacemakers, or taking digoxin or beta-blockers), and lack of another source. Leucocytosis with a left shift and elevated erythrocyte sedimentation rate usually are present as well as a mild elevation in alkaline phosphatase or transaminases; eosinophilia occurs in less than 5% of cases. A rash may or may not be present—when it is it usually is maculopapular involving the trunk, but it can involve the palms and soles. If the rash becomes confluent or vesicles, bullae, mucous membrane involvement is present, toxic epidermal necrolysis (Stevens-Johnson syndrome) should be suspected and a dermatology consultation obtained immediately. Drug fever and other manifestations usually begin to resolve within days after the offending drug is discontinued.

Work-up should include a complete physical examination, complete blood cell count, urinalysis, chest radiograph, and blood cultures as well as cultures of other potential sites. If no obvious source is discovered all noncritical medications should be stopped. Postoperative MI should be suspected, especially if any other signs are present. These may be silent, presenting only with fever.[6] Serial ECGs and cardiac enzyme panels should be obtained in such patients. If still no source is apparent, work-up for DVT or pulmonary embolus should be considered.

RENAL AND ELECTROLYTE MANAGEMENT

Acute renal failure postoperatively is not uncommon and carries a high mortality in the elderly. Rates are especially high after emergency surgery, cardiac surgery, aortic aneurysm repair, or biliary tract surgery for obstructive jaundice. More common after general surgery is postoperative renal insufficiency defined as a serum creatinine of 1.6 mg/dL or higher, seen in 25% to 30%.[4] In half of these cases the creatinine never goes above 2.0 mg/dL, and starts returning to normal by the fourth postoperative day. Prerenal factors are implicated most often in the elderly, but urinary tract obstruction always needs to be ruled out and acute tubular necrosis also should be considered, especially if aminoglycoside antibiotics, contrast dye studies, or hy-

potensive episodes were involved. Usually patients are relatively oliguric in the perioperative period and the presence of polyuria should lead to suspicion of nonoliguric renal failure. The most important intervention to prevent postoperative renal failure is to avoid intravascular volume depletion in the perioperative period.

The posttransurethral resection of the prostate syndrome is not uncommon and is relatively specific for this operation.[36] It is characterized by nausea, vomiting, restlessness, confusion, seizures, lethargy to coma, visual abnormalities to blindness, hypotension, and cardiorespiratory depression.[22] It may develop intraoperatively or later in the perioperative period. Previously, when water was used as the irrigant, the syndrome was ascribed to dilutional hyponatremia and free water intoxication. At this time the most common irrigant is a slightly hypotonic (200 mOsm/L; 1.5%) solution of glycine and the cause of the syndrome appears to be much more complex and owing to water intoxication and the toxic and osmotic effects of glycine and its metabolites acting to various degrees in different patients.[1] Patients undergoing this and other procedures where large volumes of irrigant are used should have serum electrolytes and osmolality monitored, especially if symptoms develop. For mild symptoms and serum Na above 120 mEq/L, close monitoring and observation probably are adequate, with a loop diuretic if volume overload is present. For severely symptomatic patients who are acutely hyponatremic with Na less than 120 mEq/L and hypoosmotic with measured osmolality less than 230 mOsm/L who do not have acute or chronic renal failure, treatment is with hypertonic saline. This may be given, for example, as 3% saline at a rate of 25 mL/hour, to a total of 100 to 200 mL given, with or without the addition of a loop diuretic and with close monitoring of serum Na. The infusion should be stopped when the serum Na comes up to 120 mEq/L, followed by fluid restriction over several days in order to decrease the risk of central pontine myelinolysis. If acute hyponatremia occurs with a relatively normal osmolality (i.e., a large osmotic gap), treatment is not clear but probably should not include hypertonic saline. In these cases, as well as in renal failure, hemodialysis is an option.

Hyperkalemia and metabolic acidosis often result from the stress of illness and surgery in the elderly patient. Risk factors are hypoaldosteronism, common in diabetics, and potassium-sparing medications. After acute intervention, if needed, a medication source should be ruled-out, in particular postassium chloride in the IV fluid.

CONCLUSIONS

Elderly patients have increased risk from urologic surgery, mostly owing to associated comorbid factors. They are also a population that can benefit greatly from surgery. In fact, the most common surgery performed in the elderly is prostate surgery, with a rate of 861.2/100,000 in 1992.[43] Most of this increased risk can be anticipated and managed so that surgery is safe. Elderly patients do need a different approach starting preoperatively and extending throughout their hospitalization, with meticulous attention given to postoperative care to maximize function and to prevent the complications seen all too commonly in this population. The risk benefit ratio for each procedure in each individual patient must be addressed carefully. This depends on the nature of the surgical problem and effectiveness of the procedure, the value of successful treatment to the patient, and the individual risks involved. With effective pre- and postoperative care the risks are minimized, the probability of a successful outcome is maximized, and the quality of life is improved for most.

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RADICAL CYSTECTOMY IN THE OCTOGENARIAN

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ABSTRACT

Purpose: We evaluated the morbidity and outcome of cystectomy and urinary diversion in patients 80 years old or older with invasive bladder cancer.

Materials and Methods: We reviewed the records of all patients older than 80 years who underwent cystectomy during the last 15 years. Of 1,186 cystectomies 44 patients (4%) were identified. Patients were evaluated for complications, mortality and functional status after surgery.

Results: The 44 patients had a median age of 81 years (range 80 to 87). Of the patients 78% had significant co-morbidity, including 41% with 2 or more medical problems. Median hospital stay was 14 days, with 20% of the patients requiring intensive care for 24 hours. There was a 51% complication rate including 25% due to surgical complications and 26% from underlying medical illness. Operative mortality was 4.5%. Within 6 months of surgery 66% were rehospitalized for medical or surgical reasons. Median survival time was 25 months. Median performance status before and after surgery decreased slightly from 70 to 65.

Conclusions: The results of this study support the use of cystectomy in octogenarians with invasive bladder cancer. Surgery can be accomplished with acceptable morbidity and mortality. Radical cystectomy in this population offers the best opportunity for sustained disease-free quality survival.

KEY WORDS: bladder neoplasms, aged, cystectomy

Cancer is the major cause of death and morbidity in the elderly.[1] There is a 60% rate of new cancer cases and more than 50% of cancer deaths in the United States occur in persons older than 65 years. As the population ages there will be a disproportionate rise in the number of new cancers. This problem is magnified by the rapid population growth that will occur during the next decade among those 80 years old or older. In 1990 there were 31.5 million persons older than 65 years in the United States, accounting for 12.5% of the population. By 2020 there will be 52 million elderly, representing more than 20% of the United States population.[2]

The increasing number of patients with bladder cancer reflects the increasing longevity. The average age of patients with bladder cancer is currently 65 years, and this is expected to increase along with the increasing mean age of the general population. Among people in the 8th decade bladder cancer is the fifth leading cause of cancer death.[3,4]

Currently, radical cystectomy is the treatment of choice for patients with invasive bladder cancer. Accordingly, we have experienced increased referrals of octogenarians for management of locally advanced bladder cancer. Co-morbidity and unique physiological changes present a surgical challenge in the elderly patient. We review our experience during a 15-year period with radical cystectomy in the octogenarian. Our aim is to assess the feasibility of radical surgery and functional outcome in these unique patients.

MATERIALS AND METHODS

A retrospective review was performed of all patients 80 years old or older who underwent radical cystectomy with urinary diversion from January 1980 until December 1995. Of 1,186 cystectomies performed in this period 44 patients (4%) were available for analysis. Patient age ranged from 80 to 87 years (median 82). There were 33 men (75%) and 11 women (25%). Patients were assessed for preoperative, intraoperative and perioperative factors. Those treated previously with radiation or chemotherapy were included in the analysis.

Preoperative. Preoperative evaluation included a history, physical examination, chest x-ray, serum alkaline phosphatase and liver function tests. Computerized tomography of the abdomen and pelvis was done to evaluate metastatic disease. Bone scans and excretory urogram were not obtained routinely. Investigations of renal, cardiovascular and pulmonary functions were done to determine suitability to undergo major surgery. The perianesthetic risk of concomitant disease was quantified using the American Society of Anesthesiologist's physical status classification.[5] Of the patients 12 (27%) had received previous radiation while 2 (4.5%) had received chemotherapy before surgery. All patients had hematuria, pelvic pain and unsuccessful local control with transurethral bladder resections, 15 (34%) had hydronephrosis on imaging studies and 14 (32%) had a palpable mass. In 15 patients (34%) bacillus Calmette-Guerin treatment had failed were BCG failures.

All patients underwent a 1-day mechanical 24-hour bowel preparation plus intravenous hydration before surgery, and perioperative antibiotics were administered. Three patients with valvular heart disease required insertion of a preoperative Swan-Ganz catheter. Of the 44 patients 30 (78%) were admitted to the hospital 24 hours before surgery.

Intraoperative. Indications for cystectomy included any muscle invading cancer not deemed suitable for segmental resection or multifocal high grade superficial tumors refractory to local therapy. Such patients had severe local symptoms of pelvic pain, frequency or incontinence. Radical cystectomy was performed in the standard fashion and included the bladder, distal ureters, seminal vesicles and prostate in men, and uterus, anterior vagina and urethra in women. Pelvic lymphadenectomy was performed in 25 patients (57%) and 4 (9%) had positive nodes. An ileal conduit was the urinary diversion of choice in all but 1 patient who had a ureterosigmoidostomy. Surgical time, blood replacement,

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type of wound closure, use of ureteral stents and intraoperative complications were recorded for each patient.

Perioperative. All patients were monitored in the postanesthesia care unit for 24 hours following surgery. Nine patients (21%) were observed longer in an intensive care unit. Postoperative morbidity was defined as any event that prolonged hospital stay. All complications were recorded and categorized as a medical or surgical cause. Postoperative functional status after surgery was based on the Karnofsky score[6] at 1 and 3 months after surgery. All hospitalizations were analyzed as to the time from initial to subsequent hospitalization, the reasons for rehospitalization and total time spent in the hospital. Postoperative mortality was defined as death in hospital or 30 days after discharge home.

RESULTS

Between January 1980 and December 1995 we treated 117 patients 80 years old or older with invasive bladder cancer. Of these patients 52 (44%) underwent cystectomy, including 44 available for review, and 65 (56%) had no cystectomy. Of the 65 patients 38 (32%) had repeated transurethral resections while the remaining 27 (23%) had either unresectable or metastatic disease. Table 1 shows the pathological stage of the 44 study cases.

Figure 1 shows the increase in the number of patients older than 80 years undergoing cystectomy. Median age was 82 years (range 80 to 87). Of the 44 patients 34 (78%) had significant co-morbid disorders. In this elderly population a cardiac history was present in 55%, hypertension in 20%, chronic lung disease in 18% and peripheral vascular disease in 13%. Overall, 16 patients (36%) had 1 added co-morbidity, 13 (29%) had 2 and 5 (11%) had 3 or more. In addition, 18 patients (27%) had undergone prior abdominal or pelvic surgery. Mean Karnofsky score before surgery was 72 (range 50 to 90).

Median surgical time of cystectomy and urinary diversion was 6.5 hours (range 4.0 to 13). Simultaneous urethrectomy was performed in 4 patients (9.5%). Average blood replacement was 1,500 ml. (range 250 to 3,000). Two patients underwent simultaneous nephrectomy for nonfunctioning kidneys and 1 underwent colon resection for adenocarcinoma of the colon. Wound closure was by either interrupted (61%) or running (30%) sutures. Retention sutures were used in 4 patients. In 19 patients (43%) ureteral stents were placed during construction of the urinary diversion.

Intraoperative complications occurred in 6 patients (14%). One patient after 7,000 cGy. to the pelvis sustained a rectal injury and was treated with colostomy. Three patients had transient hypotension and 2 sustained a supraventricular arrhythmia during surgery. Median hospital stay after surgery was 14 days (range, 8 to 40). In the last 5 years median hospital stay was 12 days.

Operative mortality was 4.5% (2 patients). An 80-year-old man with coronary and peripheral vascular disease who sustained a myocardial infarction died 12 days postoperatively. An 82-year-old man died 42 days after surgery of an upper gastrointestinal bleed and renal failure. One patient died of recurrent disease within 90 days after surgery. Since 1985 there has been no surgical mortality in 35 patients.

Postoperative morbidity was encountered in 23 patients for a 51% complication rate. Of the patients 10 (43%) had medical complications, 5 (22%) had only surgical complications, and 8 (35%) had surgical and medical complications. Table 2 lists the complications according to surgical or medical reasons. Of the patients 10 (41%) had only 1 complication and 13 (59%) had 2 or more complications. Congestive heart failure was among the most common medical complications, present in 5 patients and responsible for 13% of all complications. A complication unique to our study was postoperative delirium, which was seen in 4 patients and was responsible for 11% of all complications. Wound infection was the most common among surgical complications, present in 5 patients who required wound care and antibiotics and responsible for 13.5% of all complications. Four patients (9%) required additional surgery for surgical complications, including closure of wound dehiscence in 3 and reexploration for pelvic bleeding in 1. Figure 2 shows the number of total complications correlated with the length of hospital stay. Median hospital stay of patients without any complications was 12 days versus 21 days for patients with any complication ($p < 0.006$).

A total of 29 patients (66%) had to be acutely hospitalized after surgery for various medical reasons. Median time for rehospitalization after surgery was 5.5 months. Hospitalizations due to medical reasons occurred an average of 3.5 months after surgery (table 3). Dehydration, acute pyelonephritis, deep venous thrombosis and fatigue were frequent medical problems. Hospitalization for surgical reasons occurred an average of 5.8 months after surgery, and included partial small bowel obstruction and ileus, and urosepsis requiring percutaneous nephrostomy placement. Two nephrectomies were performed in 1982 for pyonephrosis. Ten patients (26%) were rehospitalized after 8.6 months for recurrent tumor. Local recurrence causing pelvic pain, fistula and constipation was seen in 4 patients. Median rehospital stay was 3 weeks. Only 5 patients required hospitalization for longer than 4 weeks.

Figure 3 shows preoperative and postoperative functional status. One month after surgery the mean Karnofsky score was 61, lower than the preoperative score ($p < 0.0001$). However, at 3 months after surgery the mean Karnofsky score was slightly higher than at 1 month after surgery ($p < 0.01$). Since 1985, none of the patients died of surgical or medical complications attributed to cystectomy.

A total of 22 patients (50%) died of disease. Overall median survival was 25 months with a median followup of 14 months (fig. 4). Of 43 patients followed for more than 1 month 21 (49%) survived the disease (12 of 17 with organ confined and 9 of 26 with nonorgan confined tumor). Six patients (14%) died of unrelated causes, including an 88-year-old man who sustained a fatal myocardial infarction 7 years after surgery.

DISCUSSION

Radical cystectomy and urinary diversion can be performed with an acceptable morbidity and mortality in individuals 80 years old or older. Prolonged hospital stay can be avoided when complications are minimized. Postoperatively, the majority of patients are able to return to acceptable functional status.

Morbidity and mortality after radical cystectomy in octogenarians are comparable with other series.[7-9] Two unique complications that are reported frequently in older cohorts are congestive heart failure and delirium.[10,11] In our series congestive heart failure accounted for 14% of the complications. Although no obvious cause was attributed to this complication, the frequent occurrence suggests the presence of impaired left ventricular function from arteriosclerotic disease. Postoperative delirium is a complication often reported in the elderly undergoing major surgery. Delirium was seen in 11% of our patients. Careful attention to pharmacokinetics of anesthetic and analgesic medication may decrease this complication in the elderly.

The hazards of cystectomy in older patients have been

TABLE 1. *Pathological stage*

	No. Pts. (%)
P0, P1, PCIS	9 (20.4)
P2–P3a	8 (18.2)
P3b–P4a	27 (61.4)
N+	4 (16)

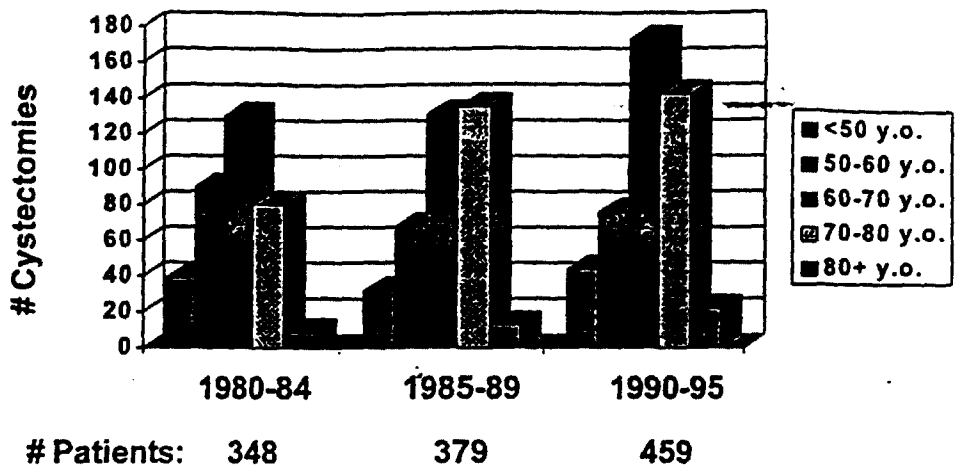

FIG. 1. Number of radical cystectomies performed at Memorial Sloan-Kettering Cancer Center (MSKCC) from 1980 to 1995 by age

TABLE 2. *Postoperative complications*

Medical	No. Pts. (%)	Surgical	No. Pts. (%)
Congestive heart failure	5 (13.5)	Wound infection	5 (13.5)
Pneumonia	3 (8.1)	Wound dehiscence	3 (8.1)
Pyelonephritis	3 (8.1)	Ileus	3 (8.1)
Urinary tract infection	3 (8.1)	Pelvic abscess	3 (8.1)
Acute tubular necrosis	1 (2.7)	Lymphocele	2 (5.4)
Other	4 (11)	Wound separation	1 (2.7)
		Bleeding	1 (2.7)

examined in several studies but only 3 address the octogenarian (table 4). Zincke reported on 19 patients who underwent radical cystectomy between 1967 and 1980. With a mortality rate of 5% and mean hospital stay of 22 days.[12] Our study reveals a similar mortality rate of 4.5% with an average hospital stay of 14 days. Our median survival of 25 months is similar to other cohorts of patients undergoing cystectomy for invasive bladder cancer. Tachibana et al reported on 9 octogenarians who underwent radical cystectomy and urinary diversions.[13] There were no perioperative deaths, morbidity rate was 67%, slightly higher than our 51% rate, and two-thirds of the patients suffered from postoperative delirium. Ogawa et al reported no operative deaths and a 44% complication rate in 9 patients older than 80 years who underwent cystectomy.[14]

Contrary to other reports,[15,16] the number of co-morbid events was not related to a particular outcome. Specifically, co-morbid disorders were not related to postoperative complications or hospital stay, which may be explained by careful preoperative assessment, improved anesthesia and no emergency cystectomies. Also, minimizing catastrophic surgical errors probably enhanced our results. Only 3 patients had wound dehiscence and 1 had to be explored for bleeding.

Our surgical time of 6.5 hours was slightly longer than other reported series. An explanation is that 57% of our patients underwent pelvic lymphadenectomy, which was not performed in the other 3 studies. Additionally, all patients underwent urinary diversion using intestine. In the Zincke of Zincke 3 patients had cutaneous ureterostomy and 1 underwent ligation of a ureter.[12] Similarly, in the series of Ogawa et al 4 of 9 patients also underwent a cutaneous ureterostomy.[14] Along with urinary diversion, ureteral stents were placed in 43% of our patients. There was no difference in complications between patients with or without a stent. Only

TABLE 3. *Rehospitalization time*

Reasons	% Pts.	Median to Rehospitalization (mos.)	Median Rehospitalization Time (wks.)	Causes
Surgical	28.9	5.8	2	Urosepsis
Medical	23.7	3.5	1	Pyelonephritis
Chemotherapy	10.5		2.5	
Recurrent tumor	26.3	8.6	2	Pelvic recurrence

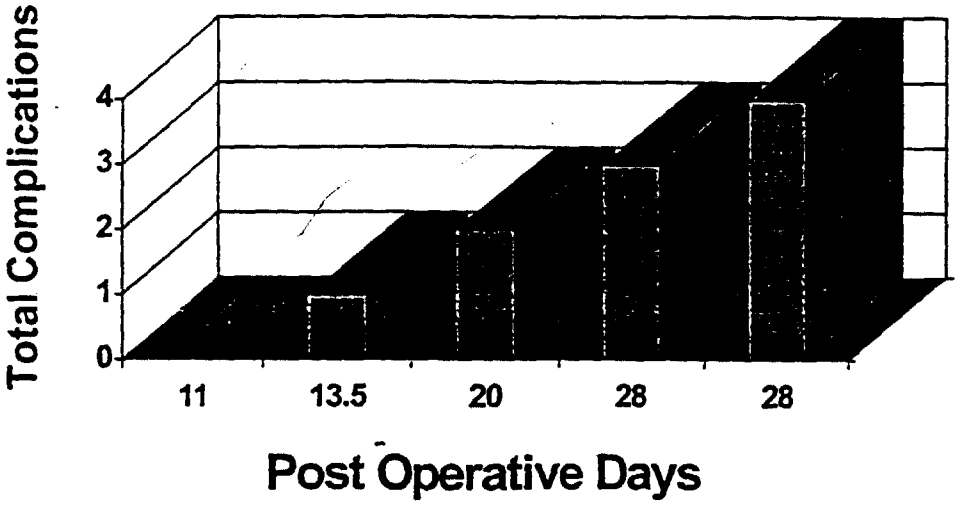

FIG. 2. Postoperative complications correlated with number of postoperative days spent in hospital

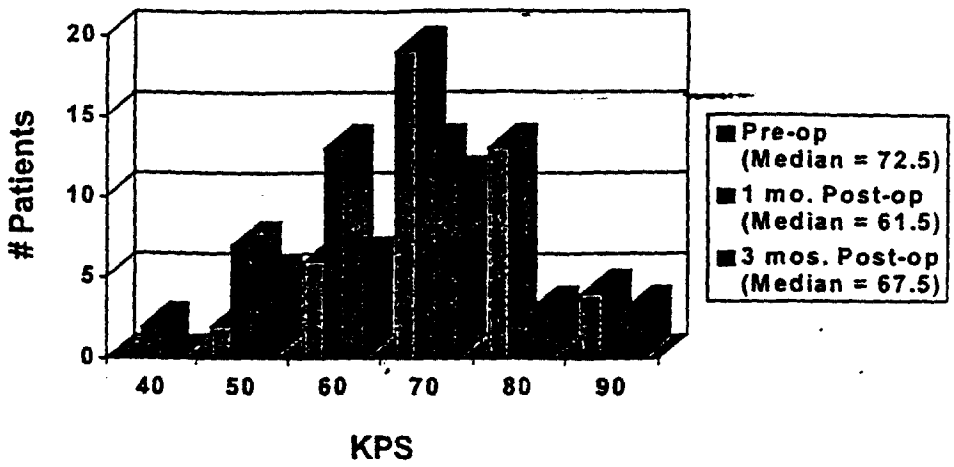

FIG. 3. Preoperative and postoperative functional status by Karnofsky performance scale (*KPS*)

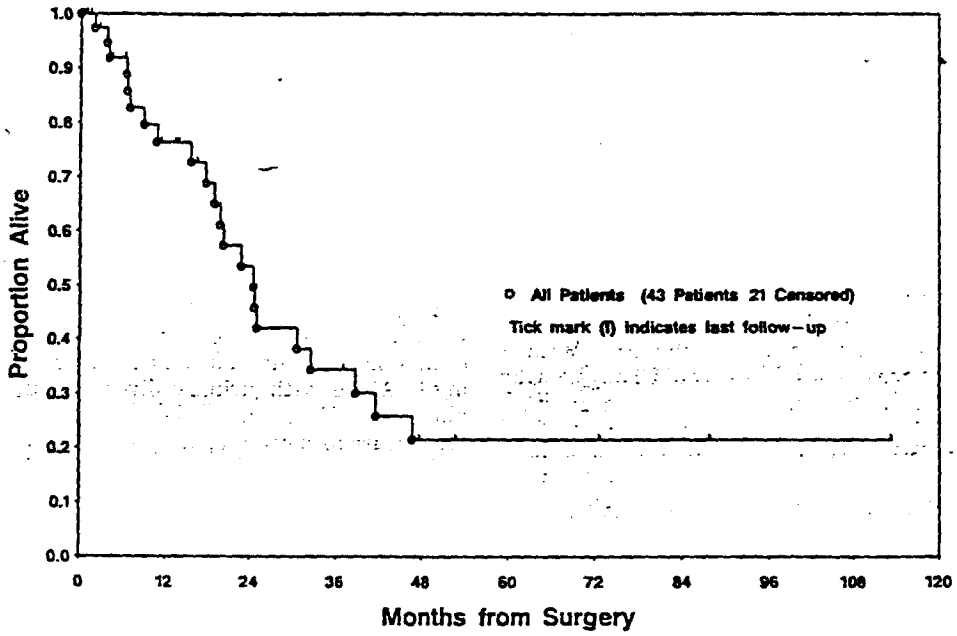

FIG. 4. Overall survival of octogenarians having cystectomy and urinary diversion for invasive bladder cancer

TABLE 4. *Radical cystectomy in the octogenarian*

References	No. Pts.	Hospital Stay	% Morbidity	% Mortality	Median Mos. Survival
Zincke[12]	19	22	48	5.3	28
Tachibana et al[13]	9	Not available	67	0	22
Ogawa et al[14]	9	Not available	44	0	36
Present series	44	14	51	4.5	24

3 patients had retention sutures and the majority of wounds were closed with interrupted sutures. There was no difference in the rate of wound dehiscence or infection by type of closure. Routine total parenteral nutrition or digitalis was not routinely administered.

Since most patients with untreated invasive bladder cancer die of disease within 2 years cystectomy may be justified when life expectancy is greater than 2 to 5 years. Older patients referred to us often have locally advanced bladder cancers with palpable masses and urinary obstruction, undergone previous pelvic surgery and are not amenable for alternative therapy such as definitive radiation therapy. Octogenarians with these characteristics should be considered for cystectomy with the intent to cure and to control local symptoms. Palliation with short-term radiation to improve quality of life is often associated with complications and provides minimal therapy.[17] Recently, Holmang and Borghede studied the side effects after short-term radiotherapy in octogenarians with invasive bladder cancer.[18] Of their patients 47% had acute side effects and 23% of all patients had to be rehospitalized for a median of 10 days. None of the 17 patients studied with severe local symptoms such as urgency, pain and incontinence improved after treatment. Finally, 5 patients (5%) died in the hospital as a result of treatment.

Few reports are available in the urological literature on the overall impact of cystectomy and urinary diversion in the elderly.[19-22] Besides impact on sexual function, little has been reported on the return of functional status after cystectomy. Orihuela and Cubelli reviewed a small number of patients with invasive disease and suggested that either cystectomy or radiation could provide favorable results in patients with Karnofsky ratings of 80 or greater.[23] In our series, despite a fair functional status and frequent comorbidity that characterized the preoperative octogenarians, the postoperative performance status was acceptable. Preop-

eratively, 82% patients had a Karnofsky score of 70 or greater compared to 62% 3 months after surgery ($p < 0.01$).

The treatment goal in any cancer surgery is to cure the primary neoplasm and preserve quality of life. We believe these can best be achieved by cystectomy for invasive bladder cancer even in the 80-year-old patient. Conservative or alternative strategies often result in progressive, uncontrolled pelvic cancer which is associated with bleeding, pain, disability, obstipation and repeated bladder manipulations. Frequent hospitalizations for months or years until death are often required unless the local bladder tumor is definitively treated.

CONCLUSIONS

By the year 2020 the projected number of octogenarians will be near 6 million or 6% of the total population. With the increasing incidence of bladder cancer many patients will be diagnosed in their 80s. Octogenarians are expected to live 6 to 8 years of active life and age alone should not defer them from a curative procedure. This series demonstrates that cystectomy with urinary diversion can be safely performed in the elderly with acceptable morbidity and mortality and without debilitating consequences.

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EDITORIAL COMMENT

The authors correctly point out that in future years the number of people in the aged population will increase, and the urologist will be faced with more and more difficult decisions in regard to performing major cancer surgery in this elderly population. They emphasize that the elderly can undergo major urological cancer surgery with acceptable morbidity and mortality. They also correctly point out that cystectomy is indicated only when local measures have failed. Radiation therapy is a poor option in such patients, especially in regard to palliation of symptoms. I believe that this communication is an important addition to the urological literature, emphasizing the place of major cancer surgery in the elderly.

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TREATMENT OF BLADDER CARCINOMA IN PATIENTS MORE THAN 80 YEARS OLD

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ABSTRACT

We reviewed 26 patients more than 80 years old with bladder carcinoma to determine if an active surgical policy is justified. Ten patients with superficial carcinoma were treated with transurethral resection; none died of cancer and half have survived 5 years. Of 16 patients with invasive carcinoma 9 underwent total cystectomy with urinary diversion and 2 underwent partial cystectomy. There was no operative mortality. Postoperative complications were not serious. Five of the 9 patients who underwent total cystectomy are alive, with a mean survival of 35 months. The 4-year crude survival rate was 50 per cent. Both patients who underwent partial cystectomy died within 2 years. One patient treated with radiotherapy alone and 1 without any treatment have survived 2 years. These results suggest that contrary to the general tendency towards conservative treatment, a curative operation is worth attempting in elderly patients with bladder carcinoma.

A curative operation for bladder carcinoma tends to be avoided in patients more than 80 years old, since surgery in such patients is believed to be associated with increased morbidity and mortality rates, and since a number of nonoperative methods are available to treat bladder carcinoma. However, several investigators have reported that elderly patients tolerate cystectomy well unless they have a serious medical disease.[1-4] For the last 7 years we have actively performed operations on ts of advanced age. Our results are reviewed to determine er this attitude is justified.

MATERIALS AND METHODS

Between January 1978 and December 1983, 22 men and 4 women more than 80 years old (mean age 83 years) were hospitalized for the treatment of bladder carcinoma. At hospitalization all but 4 patients had 1 or more significant medical diseases and/or undernutrition. Hypertension was present in 9 patients, an abnormal electrocardiogram (for example auricular fibrillation and bundle branch block) in 11, chronic obstructive lung disease in 8 and decreased renal function in 2. Anemia (hemoglobin less than 11 gm./dl.) was found in 9 patients and hypoproteinemia (total protein less than 6 gm./dl.) occurred in 15.

Ten patients with superficial bladder carcinoma were treated with transurethral resection. Histological findings consisted of grade I, stage pTa transitional cell carcinoma in 1 patient, grade II, stage pT1 disease in 8 and grade II, stage pT2 cancer in 1. Transurethral resection was repeated 2 or more times in 5 patients because of intravesical recurrence. One patient with stage pT2 carcinoma received radiotherapy subsequent to transurethral resection.

Eleven patients with invasive bladder carcinoma underwent an open operation with a total of 1,600 rad preoperative radiation for 4 days. Of these patients 9 underwent total cystectomy plus excision of the urethra with ileal conduit diversion (5) or cutaneous ureterostomy (4). No pelvic lymph node dissection was done. All 9 patients had transitional cell carcinoma (table 1). Mean operating time was 4 hours 51 minutes for 1-stage rethrectomy with ileal conduit diversion and 3 hours 45 es for cystourethrectomy with cutaneous ureterostomy. Average blood loss was 1,086 and 720 ml., respectively. The remaining 2 patients in this group underwent partial cystectomy because of questionable curability in 1 and histological diagnosis of adenocarcinoma in the other. Operative time averaged 2 hours 45 minutes and mean blood loss was 565 ml.

One patient with stage T4 adenocarcinoma was treated with arterial infusion of an anticancer drug. One patient with stage T3 carcinoma was given 6,000 rad radiation because frequent attacks of angina pectoris precluded cystectomy. Three patients with invasive carcinoma received no treatment because of coexisting serious medical diseases (cardiac failure and cerebral infarction), widespread metastases and extreme old age (92 years), respectively.

RESULTS

There was no operative mortality. No serious disease occurred after transurethral resection. The only complication was delirium lasting for a few days in 1 patient. Of the 10 patients in this group 4 died at 12, 37, 46 and 58 months, respectively, after the first resection. The causes of death were respiratory failure, cardiac failure, cerebral hemorrhage and senescence. Survival for the 6 patients still alive ranged from 15 to 78 months, with a mean of 57 months. The only patient treated with transurethral resection and radiation has survived 74 months.

Of the 11 patients who underwent a major operation 4 had postoperative complications, which improved with conservative treatment (table 1). Pre-existing medical diseases were not related to the morbidity. Of the 9 patients who underwent total cystectomy with urinary diversion 5 are alive without evidence of recurrence (mean survival 35 months) and 4 died (mean survival 16 months). Three patients died of cancer and 1 who received palliative cystectomy survived only 4 months. Both patients who underwent partial cystectomy died of cancer after an average survival of 14 months.

One patient treated with radiation therapy alone has survived 26 months without evidence of metastasis. Another patient treated with infusion chemotherapy died of cancer 22 months after the diagnosis. Of the 3 patients without any treatment 2 died within 7 months but a 92-year-old woman survived 28 months. Table 2 shows the crude survival rates according to the methods of treatment.

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TABLE 1. *Complications and outcome in patients undergoing total or partial cystectomy*

Pt. No.—Age—Sex	Grade	Stage	Preop. Condition	Postop. Complication	Outcome (mos.)
			Total cystourethrectomy with ileal conduit diversion		
1—80—M*	III	pT3	Anemia and hypoproteinemia, abnormal electrocardiogram	Pelvic abscess, renal deterioration	Died of Ca (4)
2—80—M	III	pT3	—	—	Alive (14)
3—80—F	II	pT2	Hypoproteinemia, obstructive lung disease, hypertension	—	Alive (23)
4—83—M	III	pT3	Hypoproteinemia, obstructive lung disease	—	Alive (27)
5—85—M	III	pT3	Hypoproteinemia, obstructive lung disease	—	Died of Ca (15)
			Total cystourethrectomy with cutaneous ureterostomy		
6—80—F	II	pT2	Abnormal electrocardiogram, obstructive lung disease	Pelvic abscess, depression	Alive (59)
7—80—M	III	pT3	Anemia and hypoproteinemia, abnormal electrocardiogram, decreased renal function, hypertension	—	Died of Ca (54)
8—83—M	III	pT2		—	Alive (54)
9—85—M	III	pT3	Anemia and hypoproteinemia, obstructive lung disease	Liver damage, delirium	Died of cerebral hemorrhage (7)
			Partial cystectomy		
10—83—F	III	pT4	Anemia and hypoproteinemia	—	Died of Ca (21)
11—90—M	Adenoca.	pT1	Anemia and hypoproteinemia, abnormal electrocardiogram, decreased renal function	Wound dehiscence	Died of Ca (6)

* Noncurative operation.

TABLE 2. *Crude survival rates according to the methods of treatment*

	Crude Survival Rates*				
	1 Yr.	2 Yrs.	3 Yrs.	4 Yrs.	5 Yrs.
Transurethral resection	10/10 (100)	8/9 (89)	8/9 (89)	6/9 (67)	4/8 (50)
Total cystectomy	7/9 (78)	4/7 (57)	3/6 (50)	3/6 (50)	
Partial cystectomy	1/2 (50)	0/2 (0)			
Radiation or chemotherapy	2/2 (100)	1/2 (50)			
No treatment	1/3 (33)	1/3 (33)			

* Number/total (%).

DISCUSSION

Contrary to the widely accepted view that operations in elderly patients are associated with an increased mortality rate,[5-7] there was no operative death in our series and the incidence of postoperative complications was not noteworthy. These satisfactory results would be attributed largely to improvement of anesthesia as well as preoperative and postoperative care. As far as total cystectomy in the elderly is concerned a few investigators have reported similar favorable results, although the morbidity rate is higher than that in younger patients.[1-4] Therefore, it seems unnecessary to avoid a major urological operation because of advanced age alone.

None of the patients treated with transurethral resection died of cancer and half have survived 5 years. Such results can be anticipated from the biological nature of superficial bladder carcinoma and the life expectancy of patients more than 80 years old. Meanwhile, 3 of the patients who had total cystectomy for invasive carcinoma died of cancer. The 4-year crude survival rate for these patients was 50 per cent. Although the number of patients is small these results compare favorably with the survival rates reported in other series for all ages.[8-10] As generally has been accepted, the patients with stage pT2 carcinoma had better results than those with stage pT3 disease. Unsatisfactory results occurred in the 2 patients with partial cystectomy, as anticipated. However, partial cystectomy would be indicated in elderly patients when a coexisting medical disease requires a less risky operation or a curative excision cannot be anticipated. Survival more than 2 years in a 92-year-old woman without treatment might be explained by slow progression of carcinoma in extreme old age.

In view of the mean 5-year life expectancy at the age of 80 years we believe that a curative operation should be attempted in such patients with bladder carcinoma.

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EDITORIAL COMMENT

ıe results reported are similar to our experience.[1] We believe that life expectancy of most elderly patients who are not seriously ill will extend beyond the predictably short course of untreated bladder cancer, thus, justifying an aggressive surgical approach. When elderly patients are treated it is essential that special attention be paid to all details of preoperative, intraoperative and postoperative care. Prophylactic digitalization, a short but effective bowel preparation with intravenous fluids to avoid preoperative dehydration, an expeditious operation with careful attention to surgical technique, use of the gastrostomy tube instead of nasogastric suction, early management in the intensive care unit and prophylactic anticoagulation are some of the measures that may help to avoid complications in these patients.

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CYSTECTOMY AND URINARY DIVERSION: A SAFE PROCEDURE FOR ELDERLY PATIENTS

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ABSTRACT — Cystectomy and urinary diversion have been done on 28 patients more than age seventy with a zero perioperative mortality. Nine female patients with an average age of 77.6 years and 19 male patients with an average age of 74.4 years with 3 patients being greater than age eighty, are the subject of this review. Complication rate, blood loss, and hospital stay were not significantly different from patients having cystectomy and urinary diversion who were seventy years of age or less. Twenty-seven of the 28 patients had muscle-invading tumors; 12 patients are alive with a median survival of greater than thirty months. Five of 10 patients who did not receive radiation therapy are alive; 7 of 18 patients who received some form of radiation therapy are alive. Six patients had been treated initially with 7,000 rad for definitive therapy of bladder carcinomas. In carefully selected patients, when appropriate attention is paid to general patient status, cardiovascular system, pulmonary function, and fluid and electrolyte status, cystectomy and diversion can be completed with an acceptable rate of morbidity.

The management of patients with invasive or extensive superficial transitional cell carcinoma of the bladder has changed in the last ten to fifteen years. In the late 1960s and early 1970s, several protocols were done to assess the validity of giving 4,000 rad over four weeks with a four- to six-week wait prior to cystectomy. In the mid 1970s and currently, 2,000 rad over one week followed by immediate cystectomy has been adopted by many centers.[1-5]

As the median age of the population increases, it is likely that all centers will be seeing more patients with a greater chronologic age presenting for management of bladder carcinoma. Treatment for superficial bladder carcinoma involves mainly transurethral resection as well as the use of various intravesical chemotherapeutic agents. However, patients with invasive disease are managed optimally with cystectomy and urinary diversion, providing careful clinical assessment indicates survivability from surgery is probable. These patients must be appropriately selected with careful consideration given to the management of their cardiovascular and pulmonary systems in the perioperative period. Recent reports by Kursh, Rabin, and Persky[6] and by Zincke[7] have also suggested cystectomy as a safe procedure in elderly patients who have been selected appropriately.

Material and Methods

In this retrospective review it should be noted that the 28 patients, aged seventy or greater, were selected from a total patient population of 79 patients managed with cystectomy and urinary diversion at our institution; they represent 35 per cent of patients. Ten patients received no radiation therapy, 5 received 2,000 rad, 6 received 4,000 rad, and 6 had received 7,000 rad prior to cystectomy and urinary diversion. Currently, our patients with biopsy-proved invasive disease

TABLE I. *Muscle invasion*

Grade	No.	Alive	Median Survival* (Mo.)
I	2	2	13 (13–15)
II†	2	1	25 (16–36)
III	15	5	30.7 (5–117)
IV	8	4	24.4 (5–79)
TOTALS	27	12	

*Figures in parentheses indicate range in months.
†One patient with no muscle invasion had extensive superficial tumor; median survival thirty-four months.

TABLE II. *Radiation therapy*

Rad	No.	Alive	Median Survival* (Mo.)
Invasive tumors			
2,000	5	4	11 (5–27)
4,000	6	1	22.5 (5–56)
7,000	6	2	7.5 (6–18)
TOTALS	17	7	
No R.T.†	10	5	49.6 (7–117)
Noninvasive tumor			
4,000	1	0	34

*Figures in parentheses indicate range.
†R.T. = radiation therapy.

TABLE III. *Complications*

Complication	No. of Patients
Obstruction of distal ileum	1
Ileus (prolonged greater than 7 days)	4
Wound infection	4
Sepsis	1
Femoral vein injury	1
Pulmonary emboli	1
Gastric dilatation	1
Acute renal failure	1

are receiving 2,000 rad pretreatment followed by cystectomy. Cystectomy at our institution includes removal of the bladder with surrounding peritoneum and fatty areolar tissue, and in females hysterectomy, urethrectomy, and resection of the anterior one third of the vagina. The most frequent method of urinary diversion was an ileal conduit. The patient population consisted of 9 females greater than age seventy, 3 of whom were in their eighties, and 19 males, all of whom were in their seventies, with an average 77.6 years for females and 74.4 years for males.

Results

Twenty-seven of the 28 patients with muscle-invading bladder tumors were treated; the 1 patient who did not have an invasive bladder tumor did have an invasive ureteral tumor, 15 patients had grade III tumors, and 8 patients had grade IV tumors (Table I). Five of 10 patients who received no radiation therapy are alive with a median survival of greater than thirty months (Table II). Patients who received planned preoperative radiation consisted of 5 patients receiving 2,000 rad and 6 patients receiving 4,000 rad prior to definitive cystectomy and urinary diversion. Of these 11 patients, 5 are alive with a similar median survival as the group who received no radiation therapy. Interestingly our patients receiving treatment with and without radiation therapy in a planned setting have similar survival rates.

The average number of tumors prior to cystectomy was three invasive tumors. The average hospital stay including preoperative time for bowel preparation or for inpatients who received one week of radiation prior to cystectomy was twenty-one days. The average blood loss for patients who have had no radiation therapy was 1.9 units with a range of 0–5 units; patients receiving 2,000 rad had an average blood loss of 3.4 units with a range of 0–6 units; patients having pretreatment consisting of 4,000 rad had an average blood loss of 4.7 units with a range of 2–7 units. Patients who initially had been treated with radiation for cure had an average blood loss of 5.2 units with a range of 3–8 units. The overall average of numbers of units transfused in this group of patients greater than seventy years of age was 3.4 units. Note is made of the fact that patients who have received 7,000 rad as definitive treatment generally have a greater blood loss; this is similar in our series.

Complications

The average hospital stay for our group of patients greater than seventy years of age was twenty-one days; this compares with the average of eighteen days for our patients who are less than seventy years of age. Other complications included wound infection in 4 patients, all of whom received 4,000 or 7,000 rad, for a wound infection rate of 4 of 28 patients; 1 patient had urinary tract sepsis that responded to intravenous antibiotics. The other common complication was a prolonged ileus greater than seven days in 4 patients. Other complications are listed in Table III. All of these responded to appropriate therapy.

Comment

Cystectomy and urinary diversion can be done safely in the elderly population. Several reports have recently directed attention to this area, including a recent report from Zincke[7] in which 19 patients eighty years or older were managed with cystectomy and urinary diversion. In his group, 10 patients had ileal conduit and 9 others had some form of cutaneous ureterostomy. The operative mortality in this series from the Mayo Clinic was 5.3 per cent with a one-year survival rate of 75 per cent.[7] In a group of patients seventy years of age treated with cystectomy, Kursh, Rabin, and Persky[6] reported no operative mortalities, and only 1 patient died five months postoperatively. Our series compares favorably with these two reviews in which careful preoperative monitoring of cardiovascular, pulmonary, as well as general nutritional status of the patient has been carefully evaluated in selective patients operated upon.

At our institution it is common to screen for metastatic disease with the use of bone scans, CAT scans of the pelvis, ultrasound, and biochemical monitoring, as well as liver function tests. Additionally, preoperative evaluation includes pulmonary function tests including room arterial blood gas as well as standard ventilatory measurements. The day before cystectomy patients are hydrated to replace the volume that had been lost during bowel preparation, as well as receiving supplemental proteins orally. Several patients in this age group requiring digoxin preoperatively have been continued on this regimen throughout the postoperative period. Patients not on digitalis prior to surgery are generally not given the drug unless fluid overload becomes apparent. This has been necessary only on rare occasions. To prevent pulmonary embolus in this age group it is not our practice to administer coumadin but rather to encourage early ambulation as well as use of TED hose or Ace bandage wrappings of the legs.

The obvious treatment goals in patients with invasive bladder carcinoma regardless of age are to provide a chance, at least, of eradicating the carcinoma as well as palliating the often disabling bladder symptoms. With appropriate preoperative screening and close postoperative monitoring, elderly patients can be treated successfully for invasive bladder carcinoma with cystectomy and urinary diversion without excessive mortality or morbidity.

In our group of patients more than seventy years of age, hospitalization, blood loss, and complications were not dramatically increased from our series of patients under seventy years of age. The median survival of our patients with muscle invasion is greater than twenty-five months, the time at which metastatic disease probably would have manifested itself if cystectomy had not been undertaken.

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RADICAL CYSTECTOMY IN THE ELDERLY PATIENT

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ABSTRACT

A total of 77 patients 65 or more years old underwent radical cystectomy with urinary diversion for invasive bladder cancer during a 10-year interval. The preoperative medical condition of the patients, operative mortality and morbidity, and preliminary survival data are reviewed by age group. Two-thirds of the patients had previous medical or surgical problems that increased the surgical risk. The over-all mortality rate was 3.9 per cent. Early complications occurred in 31 per cent of the patients, with an increased risk of complication associated with previous illness and major pelvic surgery, and preoperative radiation therapy. The complication rate was not related directly to age, with patients 65 to 69 and more than 75 years old having lower rates than those 70 to 74 years old. The 3-year survival rate free of disease ranged from 58 per cent in the youngest group to 39 per cent in the oldest group, which is comparable to survival statistics for younger patients undergoing cystectomy. Only 5 patients have died of intercurrent illness, while 20 have died of metastatic disease.

The elderly patient who presents with invasive carcinoma of the bladder poses a difficult problem for the practicing urologist. Most investigators agree that optimal therapy in terms of curability of the cancer requires radical cystectomy with or without preoperative radiation, yet are reluctant to subject elderly patients, many of whom have significant medical problems, to such major surgery. Indeed, studies in Britain have suggested that the survival advantage of combined preoperative irradiation plus cystectomy over radiation therapy alone disappears in patients >65 years old.[1] On the other hand, several recent reports have demonstrated that elderly patients can undergo cystectomy without undue morbidity or mortality.[2-4] We review our experience with 77 patients ≥65 years old who underwent radical cystectomy for bladder cancer.

MATERIALS AND METHODS

Between July 1972 and February 1983, 300 consecutive patients who presented with invasive bladder cancer were considered candidates for cystectomy with intent to cure. Patients who initially had received radiation therapy as definitive treatment and who underwent salvage cystectomy because of local failure or severe symptoms were excluded from this study. At laparotomy 9 patients (3 per cent) had metastatic nodal disease above the aortic bifurcation or unexpected liver metastases and underwent urinary diversion only. An additional 3 patients were treated conservatively because of severe illness: 1 had severe obstructive pulmonary disease, 1 had massive obesity and 1 had severe atherosclerotic peripheral vascular disease. Of the remaining 288 patients 79 were ≥65 years old, including 2 whose charts were unavailable for review and who also are excluded for the sake of accuracy. The remaining 55 men and 22 women were divided into 3 groups: 29 men and 5 women 65 to 69 years old, 18 men and 9 women 70 to 74 years old and 8 men and 8 women ≥75 years old. The oldest man and woman were 78 and 82 years old, respectively.

A total of 31 patients had undergone prior conservative efforts to control the primary tumor, including ≥3 transurethral resections (18 per cent), intravesical chemotherapy (16 per cent) or segmental resection (12 per cent). On the other hand, 46 patients (60 per cent) had symptoms or the diagnosis of invasive bladder carcinoma established <4 months before cystectomy. Indications for cystectomy were based on cystoscopic and biopsy findings, and included any patient with muscle invading cancer not suitable for segmental resection regardless of grade, any high grade tumor associated with carcinoma in situ, rapidly recurring multifocal high grade tumors or carcinoma in situ with irritative bladder symptoms not responsive to intravesical chemotherapy.

More than half of the patients had significant medical problems, such as cardiovascular, pulmonary or renal disease, which increased the surgical risk. In addition, 27 per cent had had previous pelvic surgery, including colon resection, open prostatectomy, gynecologic surgery or segmental resection. Of the patients 23 (30 per cent) received planned preoperative radiation of 1,600 to 2,200 rad, 1 received 4,500 rad and 1 had had an unknown dose of radiation for uterine fibroids. Within each age group the number of patients with various medical and surgical problems, and their relationship to postoperative complications is shown in table 1. The distribution of patients by pathologic stage at operation within each group is shown in table 2.

The operation was done via a standardized surgical technique, consisting of radical cystectomy and meticulous en bloc iliac lymph node dissection. The details of this technique have been described previously and are recorded on film.[5,6] Node dissection often was managed less aggressively in patients with severely atherosclerotic vessels than in younger patients. In addition to the standard procedure 3 patients underwent sigmoid colon resection, 4 had concomitant urethrectomy and 1 woman had resection of the pubic ramus for tumor extension. Three patients underwent unilateral nephroureterectomy for nonfunctioning hydronephrotic kidneys, usually associated with infection. The majority of patients underwent standard ureteroileal cutaneous urinary diversion. However, 3 patients underwent ureterosigmoidostomy, 1 of whom underwent conversion to an ileal loop 6 months postoperatively because of obstruction.

All patients were given prophylactic digitalis, if not already receiving the drug, and underwent a short 24-hour bowel preparation plus intravenous hydration for 12 hours preoperatively. Patients with significant cardiopulmonary disease had a pulmonary artery catheter placed to assist in fluid management perioperatively. All patients were monitored routinely in the

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TABLE 1

	Age Group (No. pts.)			Early Complications	
	65–69	70–74	≥75	Total No. Pts.	No. Related to Prior Medical or Surgical Problems
Medical problem					
Previous myocardial infarction	6	3*	1	3	2
Hypertension with medication	6	4†	1	4	3
Arrhythmia on medication	2	2	0	2	2
Congestive heart failure on digitalis	1	1	0	0	0
Peripheral vascular disease	2	1	0	0	0
Abdominal aneurysm	1	1	0	0	0
Anemia and hypoalbuminemia	0	0	1	1	1
Chronic obstructive pulmonary disease	3	5*	2	4	3
Restrictive lung disease	1	0	0	0	0
Diabetes mellitus, noninsulin dependent	2	0	0	1	1
Hydroureteronephrosis	2	6†	3	5	0
Nonfunction of 1 kidney	4	0	1	1	0
Medullary sponge kidney	0	1*	0	1	1
Total No. pts. (%)	21	15	9	20 (44)	14
Surgical problem					
Segmental resection	5	4†	1	4	3
Open prostatectomy	2	1	1	1	1
Anterior resection of colon Ca	0	2	0	1	1
Other colon resection	1	0	0	0	0
Uterine or ovarian surgery	1	1	2	0	0
Abdominal aneurysm repair	1	1	0	0	0
Total No. pts. (%)	9	8	4	7 (33)	5
Preop. radiation therapy					
1,600–2,200 rad	13‡	7	3	9	6
4,500 rad	0	0	1	0	0
Unknown dose for fibroid uterus	0	1	0	1	1
Total No. pts. (%)	13	8	4	10 (40)	7

* Includes 73-year-old man who died of respiratory and renal failure, wound dehiscence and sepsis following urinary leakage.
† Includes 72-year-old woman who died of myocardial infarction with gram-negative sepsis.
‡ Includes 68-year-old man who died of myocardial infarction with subphrenic abscess and sepsis.

TABLE 2. *Pathological stage of tumor at operation*

	% of Age Group		
	65–69	70–74	≥75
Stage:			
P0–P1	29	37	44
P2–P3A	27	33	19
P3B–P4	44	30	37
Pos. nodes	21	26	13

surgical intensive care unit for 24 hours postoperatively. Most patients also received prophylactic anticoagulation with parenteral warfarin sulfate postoperatively until they were discharged from the hospital.

Patients were followed until the 5-year anniversary, recurrence or at least through December 1982, and a survival curve free of disease was created actuarially according to the method of Kaplan and Meier.[7] Statistical significance was computed by the log-rank method.[8]

RESULTS

There were 3 postoperative deaths, for an over-all mortality rate of 3.9 per cent. A 68-year-old man with a subphrenic abscess and sepsis suffered pneumonia and died of massive myocardial infarction 48 days after reoperation. A 72-year-old woman with gram-negative sepsis died of a cerebrovascular accident and a massive myocardial infarct after 16 days. The remaining 73-year-old man died of respiratory and renal failure, wound dehiscence and sepsis 34 days after reoperation for urinary leakage.

Early postoperative morbidity, defined as any complication requiring prolonged hospitalization, developed in 26 patients, for an over-all rate of 34 per cent. The incidence of specific complications within each age group is listed in table 3 along with the median days of hospitalization for each complication. Of the patients 8 (10 per cent) suffered an early complication that required reoperation. The relationship between early com-

TABLE 3. *Early complications and median hospitalization*

	Age Group			Median Postop. Hospitalization (days)
	65–69	70–74	≥75	
All pts.	34	27	16	12 (range 9–50)
No complications	26	14	11	11
Any complications	8	13	5	20
Operative mortality	1	2	0	—
Wound infection:	2	0	0	29
Abscess (reoperated)	0	1	0	20
Dehiscence (reoperated)	2*	1†	0	29
Small bowel obstruction (2 reoperated)	1	2	0	39
Fistulas (enterovaginal/enterocutaneous)	1*	2†	0	50
Ventral hernia (reoperated)	1	0	0	39
Ureteroileal obstruction (reoperated)	0	0	1	30
Urine leakage (reoperated)	0	1†	0	—
Subphrenic abscess (reoperated)	1*	0	0	—
Femoral artery thrombosis (reoperated)	0	1	0	14
Retroperitoneal bleeding	0	2‡	0	13
Sepsis	1*	3†‡	0	47
Great toe embolus	1	0	0	11
Persistent gastrostomy drainage	0	1	0	19
Prolonged ileus	2	0	1	14
Pneumonia	3*	1†	1	29
Pulmonary embolus with respiratory arrest	0	1	0	21
Status asthmaticus	1	0	0	39
Seizure	1	0	1	13
Probable cerebrovascular accident	0	1‡	1	14
Transient delerium	0	0	2	23
Myocardial infarct	1*	2‡	0	20
Congestive heart failure	2	0	0	20
Arrhythmias	3	3	1	14
Renal failure	0	1†	0	—
Lower gastrointestinal bleeding	2	1†	0	34

Patients who died postoperatively are not included in the data on median hospitalization.
* Includes 68-year-old man who died of massive myocardial infarction.
† Includes 73-year-old man who died of respiratory and renal failure following urinary leakage.
‡ Includes 72-year-old woman who died of massive myocardial infarction.

plications, and previous medical and surgical problems is shown in table 1. Of 51 patients with major medical problems or previous pelvic surgery 20 (39 per cent) suffered an early complication compared to only 4 of 27 (15 per cent) with no such history. In addition, 10 of 25 patients (40 per cent) who received radiation therapy preoperatively had early postoperative complications compared to 30 per cent of those not receiving radiation.

Late complications are unrelated to recurrent cancer, occur after the patient is discharged from the hospital and cause major morbidity or require rehospitalization. Meaningful data are difficult to obtain because of the variable length of followup and the inability to exclude recurrent cancer as the etiology of some complications. However, through December 1982, 21 patients had suffered ≥1 late complications resulting in 10 additional operations. Parastomal hernia, the most common complication, occurred in 6 patients, loss of function of 1 kidney in 4, ureteroenteric obstruction in 2, small bowel obstruction in 2, fistulas in 2, enterocele in 2, hepatitis in 2, nephrolithiasis in 1, ventral hernia in 1 and leg edema in 1. Of the surviving patients with early complications 37 per cent also suffered a late complication, while the incidence was only 26 per cent among those with no early complication.

Although noncancer deaths were considered failures in the actuarial survival free of disease by age group, they accounted for only 5 deaths among the 3 groups (see figure).

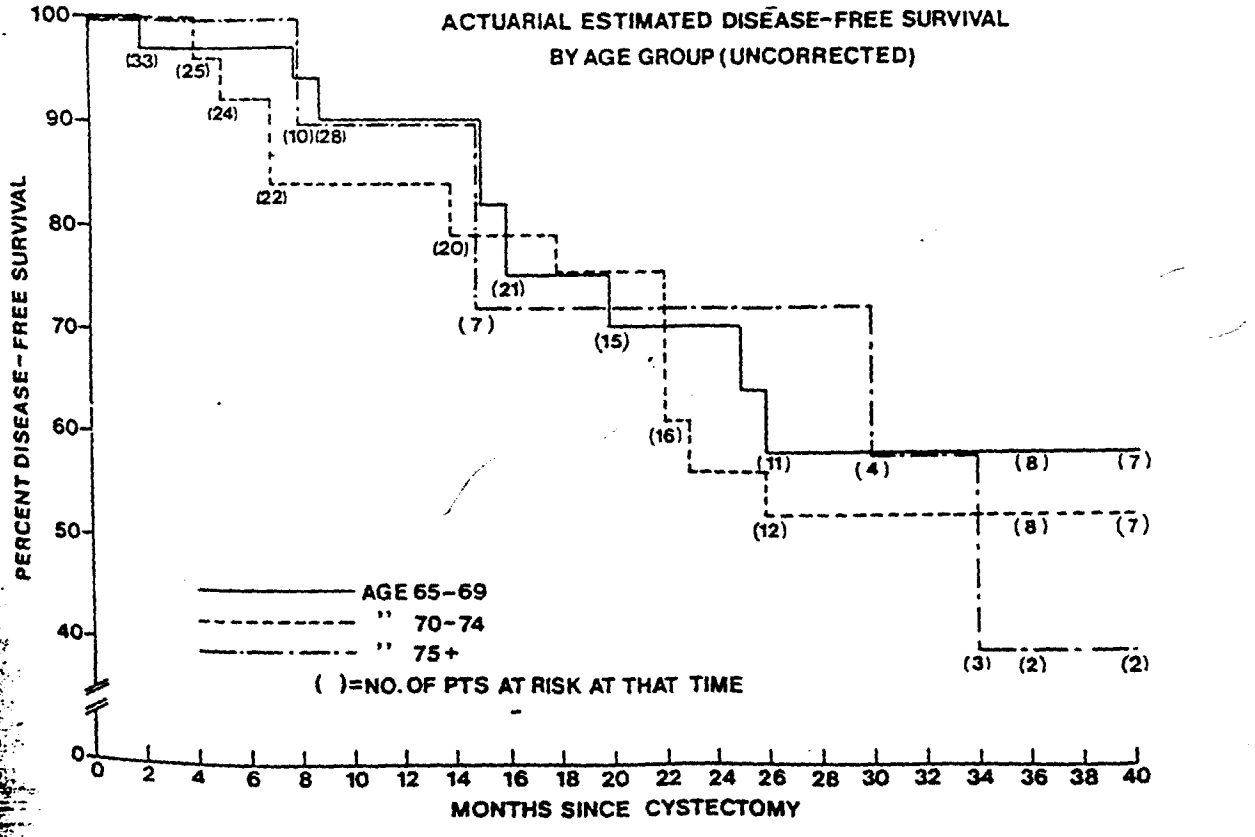
DISCUSSION

According to these data radical cystectomy with en bloc lymph node dissection and urinary diversion can be done in patients >65 years old with acceptably low operative mortality and morbidity. The postoperative mortality rate of 3.9 per cent is higher than our previously reported rate in primarily younger patients.[9] However, this rate compares favorably with that reported after simple cystectomy or radical radiation therapy.[10,11] Recent reports by Zincke,[4] Drago and Rohner,[2] and Lamb and associates[3] demonstrated comparable results with cystectomy in older patients. In this series the average postoperative hospitalization and the incidence of early complication were not markedly different from those reported for younger patients.[9]

Older patients with bladder cancer often present with a history of pelvic surgery and/or major medical problems, which increase the risk of postoperative mortality and morbidity following radical cystectomy. However, it is surprising how well the majority of patients tolerate surgery. Of the 26 patients with cardiovascular problems only 8 suffered cardiopulmonary complications postoperatively, mostly relatively minor arrhythmias. However, patients with previous pelvic surgery, including segmental resection, were more likely to have wound infections and small bowel obstruction than other patients. There also was an increased risk of complication associated with preoperative radiation in these patients, which differs from reports of studies with younger patients.[12]

Other investigators have related nonfunction of 1 kidney to an increased risk during cystectomy.[13] However, of 6 patients with unilateral nonfunction in this series only 2 had postoperative complications, 1 of whom also was diabetic and hypertensive. Of the 6 patients 1 underwent nephroureterectomy at the time of cystectomy without difficulty.

It is interesting that among our oldest group of patients (≥75 years old) there were no postoperative mortalities and only 3 serious complications (1 ureteroileal obstruction that was repaired, 1 pneumonia with delerium that resolved and 1 seizure with transient hemiparesis that also resolved). By contrast, these patients had approximately the same incidence of preoperative medical and surgical problems as the other age groups. We are unable to explain this interesting finding except to note that half of the oldest patients were women, compared to only a third of the patients <75 years old. There has been some suggestion in other series that women may do better than men following cystectomy, although this primarily has referred to survival rather than complication rates.[12] In addition, fewer patients in the oldest group had positive nodes at surgery than



the younger patients. However, the number of patients in the oldest group is too small to justify drawing any broad conclusions.

The majority of our patients have not been followed long enough to determine meaningful 5-year survival rates. However, the 3-year survival is >50 per cent in the 2 younger age groups and approximately 40 per cent in the oldest group (see figure). Differences between the groups were not significant to 36 months ($p > 1$). The trend of these survival statistics is similar to that reported in several other series of patients of all ages undergoing cystectomy for bladder cancer, with 5-year survival between 33 and 52 per cent.[1,10,14] By contrast, patients treated with radiation therapy alone generally have a much lower survival rate. In a prospective randomized study in England Bloom and associates found an unexplained improvement in response to radiation therapy with increasing age to the point that survival equaled that achieved by combined radiation plus cystectomy in patients 65 to 70 years old.[1] However, in the study by Miller and Johnson of 382 patients >60 years old who received radiation therapy at M. D. Anderson Hospital, the 3 and 5-year survival rates were only 22 and 14 per cent, respectively.[15] The reported recurrence rate of cancer within the pelvis after radiation has been between 40 and 70 per cent, and only a minority of these patients will be candidates for salvage cystectomy because of metastases or debilitating illness.[12,16]

Finally, definitive radiation therapy is not without risk of morbidity and mortality, especially in the aged. In the M. D. Anderson study there was a 5 per cent incidence of fatal complications and an additional 9 per cent incidence of serious nonfatal complications during radiation, many requiring operative treatment.[15]

Definitive therapy of any kind may be withheld from the elderly patient with invasive cancer because of the likelihood that intercurrent disease is more apt to cause death than the cancer itself. However, it is interesting that in our patients only 5 died of a noncancer illness, while 20 died of metastatic cancer, most ≤2 years after cystectomy. We believe that the life expectancy of most elderly patients who are not seriously ill will extend beyond the predictably short course of untreated invasive bladder cancer, thus, justifying an aggressive surgical approach.

During this 10-year interval cystectomy was withheld from only 3 patients >65 years old because of overriding medical problems. All 3 patients died of metastatic bladder cancer. However, there undoubtedly were other elderly patients who never were referred to us because the primary physician believed that they were unsuitable candidates for cystectomy. This may be an unavoidable source of bias in this study.

When elderly patients are treated it is essential that special attention be paid to all details of preoperative, intraoperative and postoperative care. Prophylactic digitalis, a short but effective bowel preparation with intravenous fluids to avoid preoperative dehydration, expeditious surgery with careful attention to surgical technique, use of gastrostomy tubes instead of nasogastric suction, early management in the intensive care unit and prophylactic anticoagulation are some of the measures that may have been helpful in avoiding complications in our patients.

CONCLUSIONS

A review of our experience in 77 patients ≥65 years old supports the concept that radical cystectomy and urinary diversion can be performed safely in the elderly patient and that these patients are at greater risk for death of inappropriately treated bladder cancer than of aggressive surgical management. In cases of invasive bladder cancer in which cystectomy promises the best possibility of cure early aggressive management should not be excluded on the basis of age.

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